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[OFFICIAL NOTICE.]

The Western Gas Association to Hold Its Next Meeting in New Orleans, La.

Just prior to going to press we received the following message from Mr. J. W. Dunbar, Secretary of the Western Gas Association: "I am instructed by the Executive Committee to announce change of meeting place from Indianapolis, Ind., to New Orleans, La. The returns of the vote so far to hand are: New Orleans, 189; Indianapolis, 63; neutral, 12."

[OFFICIAL NOTICE.]

Eighteenth Annual Meeting, Ohio Gas Light Association.

OFFICE OF THE SECRETARY,
DELAWARE, O., Feb. 18th, 1902.

The Eighteenth Annual Meeting of the Ohio Gas Light Association will be held at Columbus, O., March 19th and 20th, 1902.

The President, Mr. Henry L. Doherty, of Denver, Col., will call the meeting to order, on Wednesday, March 19th, at 9:30 A.M., in Convention Hall at the Great Southern Hotel, the headquarters.

The Executive Committee have made a radical departure from the usual programme custom, in that no formal papers will be presented; but the following subjects will be offered for discussion, written opinions having already been submitted by several prominent men in the profession:

"Equity, Legality and Advisability of Charging Different Rates for Illuminating and Fuel Gas."

"Distribution of Gas at High Pressure."

"Future of the Gas Business."

"Is There Any Economy in a Full-Depth Bench over a Half-Depth; and Why?"

"Can Iron Meter Connections be Used to Better Advantage than Lead?"

"Are Loose-leaf Ledgers Desirable for Gas Company Records?"

"How May Complaints be best Cared for?"

"Should an Individual Pressure Regulator be Used on Every Meter?"

"Recent Developments in By-product Coke Ovens."

"Recent Developments in Inclined Retorts."

"Coke Handling."

"Isolated Generator Firing of Benches."

"Domestic Water Heaters."

"State Regulation of Quasi-public Corporations."

"The Best way to Extend Gas Mains into New Suburban Territory or New Additions; and the Best Way to Reinforce Insufficient Pressure in a Certain Section of a City."

"Wrinkle Department;" edited by Mr. E. E. Eysenbach, of Columbus, O.

"Novelty Advertising Department;" edited by Mr. B. W. Perkins, of South Bend, Ind.

The Question Box, which is always an interesting feature, will be given special consideration. Each member is requested to make contributions for this, and send them to the Secretary not later than March 8th, so that they may be printed.

An opportunity will be given all of the speakers at the meeting to correct their remarks before leaving Columbus, but not later, as all the reports will be turned over to the printers immediately after the adjournment of the meeting.

The Great Southern is conducted on the American and European ptans, and the following rates have been secured for the meeting: American plan, $2.50 to $4 per day; European plan, $1 to $2.50 per day. The Southern hopes to entertain all of the Association, and will put forth every effort to make the members comfortable. The most satisfactory quarters are always obtained by writing in advance to the hotel people.

The Secretary will furnish with pleasure application blanks for membership, and any further information which may be desired relative to the meeting.

T. C. JONES, Sec'y.

[OFFICIAL NOTICE.]

Fourth Annual Meeting, Southwestern Gas, Electric and Street Railway Association.

SOUTHWESTERN GAS, ELECTRIC AND STREET RAILWAY ASSOCIATION,
OFFICE OF THE SECRETARY,
WACO, TEX., Feb. 8th, 1902.

The Fourth Annual Meeting of the Southwestern Gas, Electric and Street Railway Association will be held in San Antonio, Tex., on the 18th to the 21st of April, 1902. As the membership is alive with interest, both on account of the place selected to meet and the good results to be obtained, a successful meeting is therefore assured. The headquarters and programme in detail will be announced later.

T. H. STUART, Sec'y.

[OFFICIAL NOTICE.]

Wrinkle Department, Western Gas Association.

WESTERN GAS ASSOCIATION,
OFFICE OF WRINKLE DEPARTMENT.
BELLEVILLE, ILLS., February 12th, 1902.

This department is now open and ready for contributions, which will be presented at the Twenty-fifth Annual Meeting to be held next May. The active co-operation of all members and friends is earnestly solicited. Please forward contributions to the Editor before April 15th.

W. E. STEINWEDELL, Editor.

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SMITHSONIAN REPORT

BRIEFLY TOLD.

THE MEETING OF THE WISCONSIN GAS ASSOCIATION.—The following mention of the first annual meeting of the Wisconsin Gas Association, which was held in Madison, Wis., the 12th and 13th days of last month, reached us just too late for printing in the JOURNAL for last week: "The meetings were held in the Senate Chamber of the State Building, under the Presidency of Mr. George MacMillan, the records being under the charge of Mr. Henry H. Hyde. A good attendance was recorded, despite the contrariness of the elements. The Mayor of Madison (Mr. Storm Bull) welcomed the visitors in hearty fashion. The membership roll was increased by the placing of 16 additional names, and 5 papers were read. President MacMillan's address was interesting all through, and one of its recommendations (that measures be taken for the establishing of a central plant for the working up of tar on joint account of the consigning gas companies) met with pronounced favor. The papers were: "The New Business Problem;" by Mr. E. Haase, of Milwaukee; "Vitrified Pipe for Gas Mains;" by Mr. E. E. Malone, of Madison; "A Year's Experience in Distributing Artificial Gas at High Pressure;" by Mr. George F. Goodnow, of Waukegan, Ills.; "Coal for Bench Firing;" by Mr. R. C. Cornish, of Racine; and "Gas Engines in the Electrical Department of a Gas Company;" by Mr. George Warnking, of Oshkosh. The discussions on the papers were spirited and interesting. The officers elected were: President, Mr. F. W. Bowen, of Kenosha; Vice-President, Mr. J. L. Hendley, of Beloit; Secretary and Treasurer, Mr. H. H. Hyde, of Racine. It was decided to hold the next meeting in Milwaukee. The outing features of the convention were an inspection of the well-equipped works of the Madison Gas and Electric Company and a visit to and through the handsome, commodious and complete buildings of the University of Wisconsin. The engineering quarters of the large institution naturally came in for the closest examination. I should have before said that in the executive session, which was a prolonged one, many live topics concerning the industry were extensively debated. The banquet at the Park Hotel, which virtually brought the proceedings to a close, was a most enjoyable affair. Ex-Senator Vilas was the toastmaster, and he performed his duties in connection therewith to the comfort, satisfaction and pleasure of the many who shared in its joys.—D."

AN ECHO OF THE MICHIGAN MEETING.—Supplementing our special editorial correspondence of last week, respecting the ninth annual meeting of the Michigan Gas Association, which was brought off in Kalamazoo, Feb. 19 and 20, is the following, which came to hand last Monday: Dear JOURNAL: "Jack" Knight, of Kalamazoo, is all right. He gave the boys of the Michigan Association "a time" that they will all long remember. Through his efforts our hotel accommodations were fine. The meetings were held in the assembly room of the Kalamazoo Club, and not a flaw could be found in the arrangements. Then, the "show" in the evening! Well; it was simply great. I might here add that President Doty is not entitled to a back seat, when, having sunk his dignity, he starts out as a promoter of fun. They called the spread after the entertainment a lunch; but it was in reality a banquet. The Humphrey people were hosts, and royal ones. The usual smoker and speech-story practice followed the food. We never had a better meeting of the Michiganders. The "Stove Agents" presented "Jack" Knight with a gold headed cane as a token of appreciation of the many kindnesses he had shown them. The many friends of Secretary Douglas will be glad to know that nothing serious came to him over his peculiar experience in the Burdick House. The experience was connected with an atmosphere "contaminated" with or by Kalamazoo gas. He likely will explain, if inquiries are directed to him personally. The Michigan Gas Association is "all right."—P.

NOTES.—The Riter-Conley Manufacturing Company, of Pittsburg, Pa., has been awarded the contract for the construction of a complete retort house for the Lowell (Mass.) Gas Light Company. The approximate producing capacity of the plant is put at 2,500,000 cubic feet per 24 hours. The retorts are to be of the horizontal type, and are to be operated by means of the West stoking machines, driven on the compressed air principle. The agency for this country of the West apparatus was secured by the Riter-Conley Company some time ago.——The proprietors of the New Britain (Conn.) Gas Light Company have arranged to rebuild their condensing plant, and have decided to equip the same with the Western Gas Construction Company's type of apparatus for coal gas plants. The contract calls for the placing of exhausting, tar extracting, washing, scrubbing and condensing plant up to taking care of a daily output of 400,000 cubic feet.

[Official Report.—Revised by the Secretary.]

PROCEEDINGS, THIRTY-SECOND ANNUAL MEETING, NEW ENGLAND ASSOCIATION OF GAS ENGINEERS.

HELD AT THE PARKER HOUSE, BOSTON, FEB. 19 AND 20, 1902.

FIRST DAY, FEB. 19.—MORNING SESSION.

According to prior notification, the 32d annual meeting of the New England Association of Gas Eengineers was convened in the Parker House, Boston, Mass., at 10 A.M. of Wednesday, Feb. 19th. The chair was occupied by the President, Mr. Walter A. Learned, of Newton, Mass. The recording desk was in charge of the Secretary, Mr. N. W. Gifford, of New Bedford, Mass.

ROUTINE BUSINESS.

The President having extended a cordial welcome to those present as visitors to take active part in the proceedings, a motion to dispense with the reading of the minutes of the last meeting was adopted.

The Secretary read the following

REPORT OF THE BOARD OF DIRECTORS.

To the Members of the New England Association of Gas Engineers: Your Directors would present the following report: They have received the following applications for membership in the Association and recommend them for election:

Active.

Barnes, W. I., Gen'l Supt., Bristol County Gas and Electric Company; Providence, R. I.

Blodget, C. W., Engineer, Providence (R. I.) Gas Company.

Campbell, A. J., Gen'l Manager, Norwich (Conn.) Gas and Electric Company.

Ellis, J. W., Pres., Providence (R. I.) Gas Company.

Fish, R. C., Supt., Taunton (Mass.) Gas Light Company.

McKnight, G., Supt., Athol (Mass.) Gas and Electric Company.

Slater, H. C., Gas and Mechanical Engineer; Boston, Mass.

Stevens, C. F., Asst. Supt., Haverhill (Mass.) Gas Company.

Tenny, A. B., Supt., Suburban Gas and Electric Company, Everett, Mass.

Walker, E. M., Supt. and Sec'y, Dedham and Hyde Park (Mass.) Gas and Electric Light Company.

Associate.

Chaney, F. V., Home Science Publishing Company, Boston, Mass.

Fraser, E. B., Treasurer, Lynn (Mass.) Gas and Electric Company.

Griswold, C. S., Foreman, Meriden (Conn.) Gas Light Company.

Riser, T. H., Manager, Welsbach Company, New England Department, Boston, Mass.

Stafford, W. K., Salesman, Abendroth Bros., Newton, Mass.

Thompson, F. de V., Gen'l Mgr., Springfield (Mass.) Gas Light Company.

The following papers have been read and approved for your consideration and discussion:

"The Advantages of the Card System in the Gas Ledger;" by A. M. Barnes, Cambridge, Mass.

"House Piping;" by C. S. Griswold, Meriden, Conn.

"Coal Gas Treatment;" by A. B. Slater, Jr., Boston, Mass.

"Distributing Artificial Gas at High Pressure in a Suburban District;" by Geo. F. Goodnow, Waukegan, Ills.

"Some Details of the Operation of a Lowe Water Gas Apparatus;" by C. F. Leonard, Fall River, Mass.

"Building Foundation for Steel Holder Tank on Quicksand Foundation;" by C. A. Learned, Meriden, Conn.

"What is a Gas Company?" by F. S. Richardson, North Adams, Mass.

"Gas Engines;" by Geo. F. Macmun, Jr., Pawtucket, R. I.

"A Model Coal Shed;" by Thos. H. Hintze, Lowell, Mass.

The Secretary has been instructed to call the attention of members whose annual dues are in arrears to article 12 of the Constitution.

On motion, the report was accepted.

ELECTION OF NEW MEMBERS.

On motion of Mr. Leach, the Secretary was instructed to cast the ballot of the Association in favor of the election to membership of those recommended for such election in the report of the Directors. The Secretary having reported that the instructions had been obeyed, the President welcomed the new members to seats in the convention and expressed the hope that they would take active part in the proceedings. The President appointed Messrs. H. F. Coggeshall, W. G. Africa and W. H. Snow a committee to introduce the new members individually to other members of the Association as occasions for such introductions were presented.

Report of Secretary.

As Secretary, Mr. Gifford presented the following report:

At the last annual meeting there were added to the rolls 12 active and 19 associate members, and there was 1 transfer from associate to active. Two resignations were accepted.

There have been lost during the year by death 3, by resignation 1, by failure to qualify after election 1, making a total (201), February 17, 1902, on the rolls of 9 honorary, 138 active and 54 associate members.

According to the instructions of the Association at the 31st Annual Meeting, there have been printed and distributed to the members 300 copies of the "Proceedings" for 1900 and 1901. The Secretary wishes to acknowledge the kindness of the American Gas Light Journal and its genial Manager in loaning cuts and other assistance in this work.

Report of Treasurer.

As Treasurer, Mr. Gifford submitted a detailed report of the receipts and expenditures, which report bore the seal of the approval of the Auditing Committee. The reports having been ordered received and filed, Vice-President McKay took the Chair, and President Learned read the following

INAUGURAL ADDRESS.

Fellow Members of the New England Association of Gas Engineers: The past year has been one of prosperity in the gas industry. Our business is a barometer of prosperous conditions as the iron market is to the commercial world. It is not my intention to review the past history of the gas business, or expatiate on the future, but present a few facts affecting our industry at the present time. The rapid growth of the business requires marked ability on the part of the gas engineer to plan judiciously for the future. Care must be taken that old methods and apparatus must not be discarded until satisfied that the gain is sufficient to warrant the changes made. The engineer must keep in touch with methods adopted in other industries, seeing if they can be applied to his own with profit; his practical knowledge and experience will be his best guides to the adoption of such methods. He must add to his many duties the commercial methods of doing business with his customer. The future development of our industry depends more upon this branch of the business than upon improvements in manufacture.

We must educate our patrons to obtain the best results from gas, both for lighting and other purposes. We reduce the cost at the meter and neglect the consumer. When one pays for gas delivered at the meter he is entitled to receive it under such conditions as to reap the highest benefit from his appliances, which should be sold at the lowest figure, but not at a loss.

To render incandescent burners more popular greater attention should be paid to them after installation. A systematic inspection that would be self-supporting might be adopted; then the best mantles could be used and a supervision maintained over the general lighting of the house and appliances therein. A house-to-house canvas will convince all how little the public know about gas appliances. The public has been fooled so often by the purchase of poor burners and governors that it is time for gas companies to act for the education of their patrons.

Incandescent burners are increasing in efficiency and attractive features, but they can never give satisfaction under variable or excessive pressure, and many incandescent burners have been discarded on this account; in fact, 90 per cent. of the complaints of poor gas and large bills are due to this cause. I believe that every gas company should sell service governors at cost, setting them at a minimum pressure, seeing that every gas appliance is adjusted under proper conditions. The consumer will soon be convinced that the governor is a desirable addition to him, and the gas company will be benefitted, not only by giving better service but by being able to carry higher pressures in the mains.

The flat flame burner, even if it is not so efficient, will always exist, as it gives a pleasant light. It is not intensity of light that we want in our homes but a pleasant, diffusive light, which can be obtained with the incandescent burner by using yellow mantles and colored globes.

The tendency is toward lower candle power gas. It can be reduced and conformed to the State laws, provided there is no fluctuation in candle power. Twenty years ago, when coal gas was sold without enrichment, there were very few complaints, except from naphthaline troubles, but with the imperfect mixtures of water and coal gas complaints are numerous. It is to be hoped that in the future we will learn how to make the proper mixture of coal and water gas, whether hot or cold, and at what point in the works to obtain the best results.

Variations in candle power as well as in pressure are unsatisfactory to all concerned. The engineer can overcome the candle variation at his works and regulate the pressure by the adoption of house governors. No system of regulation at the works or by district governors can be satisfactory under all conditions. Any amount of pressure governed at the point of consumption should be the rule at the present time.

It would be interesting to know the future effect of Texas oil on the market. It must displace a large quantity of gas oil which is now used for fuel purposes, thereby causing a surplus of gas oil, which should affect prices. It is very high in sulphur which can be partially removed by blowing air into the oil. The analyses of the different oils vary considerably. The sample that came under my personal inspection contained 1.62 per cent. sulphur and 6 per cent. light oil; gravity, 45½° B. About 84 per cent. of the product came off above 370° F., at a gravity between 29° and 34° B. Where Texas oil has been used for the manufacture of gas it is not as efficient by 20 per cent. as gas oil. In a water gas plant the best conditions exist for making bisulphide of carbon from the sulphur in the oil, for the removal of which no provision is made in our present method of purification. Oil that contains 1½ per cent. sulphur, or gas coal containing 3 per cent. sulphur cannot be used for gas manufacture in Massachusetts, and come within the requirements of the law, which state that there shall not be more than 20 grains of sulphur in 100 feet of gas. The danger in a steam plant from the use of oil, coal and coke containing a large quantity of sulphur, is the corrosion of the iron in the horizontal flues and unlined iron chimney, which is an excellent air condenser, especially when the flue temperatures are low and the fires banked. More attention should be paid to the quality of the materials that we purchase. If gas oil is to be bought the principal consideration is to obtain oil which upon fractional distillation will not show any marked variations in the gravity of the distillates. The quality of the oil is but slightly affected by gravity, provided the heats are suited to it. A large quantity of gas oil on the market is composed of heavy oil, cut back with a light product to a gravity of 38° to 40° B. We have different oils in the mixture; naphtha, that requires a very low heat and heavy oil that necessitates a high heat for its gasification. We try to obtain a heat that will fulfill all these conditions, but it is impossible. The naphtha is first gasified by a low heat to prevent lampblack and not high enough to make gas out of the heavy parts of the oil. The result is that 12 to 15 per cent. of the oil gasified is tar, and 30 per cent. of the tar is oil lighter than water.

Analysis of Two Gas Oils of the Same Gravity, but of Different Composition.

No. 1.

Specific gravity, 39° B., 0.8285, at 60° F.

Temperature, Degs. F.	Per Cent. Weight.	Degs. B.	Sp. Gr. at 60° F.
320 to 450	8.85	63	.7254
450 to 500	4.64	51	.7735
500 to 550	6.25	47	.7099
550 to 580	6.25	44	.8046
580 to 600	7.70	42	.8139
600 to 660	24.43	37.5	.8360
Residue	40.10	32.5	.8611
	98.22		

No. 2.

Temperature, Degs. F.	Per Cent. Weight.	Degs. B.	Sp. Gr. at 60° F.
490 to 540	16.25	45.5	0.7097
540 to 564	15.62	42	0.8139
564 to 620	16.25	41	0.8187
620 to 700	15	40	0.8234
700 and beyond	16.50	39	0.8285
Residue	18.37	35.5	0.8459
	97.99		

The excessive demands for gas coal have caused the shippers to be more careless in the preparation and selection of their coal, probably seeking mines of poorer quality. These different coals are mixed at tidewater. The result is that the sulphur in the so-called standard coals has increased considerably. Iron in the coal shows itself in the coke, and we are fully aware of its presence in the clinker of the coke in the water gas generator. The sulphur in gas coal distributes itself, depending upon the amount of the moisture in the coal. With dry coal about one-half of the sulphur goes into the gas and the balance into the coke. If the coke is used in the manufacture of water gas then the largest portion of the sulphur passes into the gas. It is important that the coal should be as free from it as possible, especially in manufacturing under Massachusetts laws.

The value of gas coal should be determined by the quantity of tar, coke, liquor and gas produced, by adopting prices based on your residual market, comparisons being made by the ordinary rule of proportions. It does not follow that the coal that produces the largest amount of gas is the cheapest, especially where there is an auxiliary water gas plant.

The tar market has been low the past year, but the prices are very firm at present. A large amount of tar has been used for macadamized roads, which are beyond the experimental stage. The success of these roads depends more upon the selection of the materials and their proper sizes than upon the tar which is used as a cement. A large amount of tar is also used to mix with coke oven tar to increase its density for concrete purposes and for making pitch. Notwithstanding the large amount of tar produced in this vicinity, 8,635 barrels of pitch were imported into the port of Boston this past year. The Gas Commissioners' report shows a high price realized from the sale of water gas tar. Maintain the high standard of your coal tar. The paper by Mr. C. F. Prichard, on "The Fuel Value of Residuals,"[1] read at the last meeting of the American Gas Light Association, should command your closest thought. It teaches you how to utilize your tar to the best advantage. Under my conditions of manufacture the best evaporative results are obtained with a mixture of 1½ barrels of water gas tar to a ton of breeze, the fuel being ⅛ tar breeze and ⅞ bituminous coal, used in the common boiler furnace.

This tar mixture has the property of burning the worst case of clinker to an ash that can be found in a poor quality of coal or coke.

Spent oxide has been sold in this market as high as $3.50 per ton, depending upon the amount of cyanogen in the material, the quantity of the sulphur not being considered. The same price has been realized under a yearly contract. The oxide is used in fertilizing material, and the price is based on the percentage of ammonia.

Gas distribution has come to be a difficult matter, with the increasing demands for gas and the large number of pipes in our streets. The tendency is to increase the pressure in our territory to aid distribution, and with it must come the introduction of governors in houses, even if they have to be put in as the property of the company, in connection with the meter. There is no reason why the pressure in your distributing system should be kept low. There is no necessary relation between the amount of pressue in your territory and your leakage. If there is such a relation it is due to bad management. Make a systematic inspection yearly and repair your leaks, and the percentage of loss will be reduced to a low figure.

If the holders are not of sufficient weight to give the required pressure use a high pressure, fan exhauster. This exhauster can be used to transfer the gas from a light to a heavy holder, from the works to the holder, or to increase the street pressure. The exhauster, by its centrifugal action, is a perfect mixer of gases, with no pulsations or variation in pressure. I will tell you what other uses it can be put to. A naphthaline stoppage occurred in our main line of pipe, one-quarter of a mile from the works. A large quantity of oil was introduced in the pipe through the services and the street lamps, but with no apparent effect. The gas exhauster was started, feeding gas in the whole pipe system. A mixture of kerosene and naphtha was introduced into the inlet of the exhauster through a sight-feed cup. The speed was 3,000 revolutions per minute. The result was a perfect atomization of the oil in the form of a mist which broke down the naphthaline, and normal pressure was restored to the system.

Another use for the apparatus (I hope you will never be in a like predicament) was this: Three years ago, while running two purifiers in parallel, to determine the effect of the rate of flow on the purification, by certain unforseen events which occurred, the 750-000-foot holder was permeated with sulphuretted hydrogen. The holder was shut off and the city was supplied from a light holder, by increasing the street pressure with the fan exhauster. What to do with 750,000 feet of foul gas caused anxious moments. A solution of sulphate of iron and caustic soda was introduced in the exhauster through sight-feed cups, and the gas was pumped through the inlet and outlet pipes, causing a circulation in the holder. In 10 hours the gas was free from sulphuretted hydrogen.

High pressure distribution by small pipes is receiving the closest study. This method might be adopted to increase the pressure in a congested district a long distance from the works, by laying a small pipe line and reducing the pressure, by an underground street governor, to that of your low pressure system, also for filling distant holders. You are all aware what Mr. F. H. Shelton has done for us in this line, and thanks are due him for his publications and liberality in giving to us the details of his system.

More attention should be paid by gas engineers to electrolysis in gas pipes, which is becoming more troublesome every year. An electrical survey of your territory should be made to determine at what point current is passing into or out of your pipe system, to locate the acute danger section and such methods of relief as the findings may warrant. The determination of the quantity of electricity is generally unsatisfactory. The pipe is uncovered, the milli-ampere meter is connected between two points of the pipe, say about 8 feet apart, and the current shunted through the instrument. By knowing the resistance of cast iron the quantity is worked out, and checked up by breaking the pipe and measuring the actual quantity passing through the opening of the pipe line. The results are unsatisfactory, because the moment the earth is covered about the pipe all the conditions change and your results are approximate. Such is not the case with a voltmeter, which will show the difference in potential between the pipes, rails and hydrants and the direction of flow of current of electricity in the pipes. These measurements can be taken by your foreman and results worked up at the office.

It was supposed that the principal danger only occurred near the power houses, where the current left the pipes to the negative pole of the dynamo, but it takes place at any point in the pipe system where the electricity leaves the pipes to a medium of less resistance, especially when the soil is of an alkaline or acid nature. Electrolysis generally shows itself near the joints where the current has passed around it. Wrought iron and lead pipes are more susceptible to its action than cast iron. Gas pipes laid with lead joints have 15 per cent. greater resistance than water pipes under the same condition. Electrolysis can be detected by the graphitic condition of the pipe. Screwed joints in wrought iron pipes have about the same resistance as lead joints in cast iron pipes of the same diameter.

A large number of tests were made at our station to determine the resistance of joints of different material under different conditions, to see if some light could not be thrown upon the subject which would be of interest to gas companies. The conclusions were that all possible resistance should be inserted into the mains by making the joints of some insulating or semi-insulating material, protecting all pipes where they pass in proximity to other conductors of electricity by some waterproof, insulated covering material, and by any other means to break up the system into as many metallic units as possible, insulated from all other pipe or trolley systems as far as practical and mechanical conditions may allow. It can be said that joints of cast iron pipe, made with Portland cement and with an asbestos or paper ring placed between the abutting ends of the pipes, give a joint of very high resistance, depending upon the amount of moisture the cement will take up after setting. The resistance of a cement joint as ordinarily made is from 15,000 to 20,000 times the resistance of a lead-caulked joint, comparing pipes of equal diameter.

All pipes passing at right angles to pipes or rails conveying electricity may act to a great extent as feeders to the main system. While the painting of pipes is found in many cases to delay or diminish electrolysis, we cannot depend upon a coat of paint as an insulating covering for pipes, notwithstanding the insulating qualities of the paint. From tests made for an easily applied waterproof insulator, for covering gas pipes crossing under tracks and pipes charged with electricity, it was found that cement covering was worthless on account of the absorption of moisture and its non-elastic qualities, but that a covering made of 3 parts of dry sand and 2 parts of tar, boiled to a pitch at 350° C., would make a mixture slightly elastic at ordinary temperature, and which applied to the surface of the pipes to a depth of 1½ inches was thoroughly waterproof and had an insulating resistance of over 1 million ohms to the cubic inch. A short piece of 2-inch pipe covered with this mixture was immersed in a strong solution of water and soda ash for 8 hours. At the end of that time it showed no signs of absorption of any solution, nor had any decrease of electrical resistance developed.

The study of the question will enable you to see the parts of the territory most affected and the changes that are taking place from time to time, opening up a wide field of study and teaching the best method of putting resistance into your system. The destruction of the pipes is not the only trouble that gas companies will have to contend with, but the likelihood of explosions, whenever opening or closing the gas pipe line conducting electricity. The remedy would be to connect each side of the opening with copper wire until the connections are made. Serious accidents from this cause have been reported the past year. Partial relief can be obtained if the power companies bond their rails and connect them at certain intervals to the return wire to their stations, but electrolysis will occur as long as any part of the rail circuit is in the ground. Bonding the rail only increases the length of time when electrolysis will show its effects.

A complete metallic circuit is the only remedy, and the trouble is to induce the railroads to adopt it. There should be intelligent cooperation between the different companies that use the earth in connection with their business.

Through the efforts of my predecessor last year this Association made

1. See JOURNAL, Nov. 18, 1901; p. 807.

a marked increase in membership. I hope that you individually will have the welfare of the Association at heart to endeavor to increase our numbers. An increase in membership will keep the dues at the present low figure and yield sufficient funds to print the proceedings. The smaller companies should be induced to send a representative.

If it were simply the reading of the papers, that could be acquired at home through the medium of the different GAS JOURNALS; but it is friendly intercourse between man and man, with his varied opinions upon the difficulties that arise from day to day, with new ideas and new methods of operation, that are of inestimable value to all companies.

How unpleasant it is to record "deceased" against the names of the members who have passed from us; but such is the course of human events.

F. C. Blood, died February 24, 1901.
D. W. Crafts, died March 12, 1901.
G. B. Neal, died July 7th, 1901.

"The faults of our brothers we should write upon the sands; their virtues upon the tablets of love and memory."

With your approval, a fitting tribute of respect to their memory will be inscribed upon the records.

To the members who have kindly prepared papers to be read at this meeting I tender my sincere thanks. For the honor of having been called to preside over the affairs of the Association I feel deeply grateful.

COMMITTEE ON PRESIDENT'S ADDRESS.

On motion of Mr. Allyn the address was referred for consideration and report to a committee of three, the members of the committee as named by Vice-President McKay being Messrs. C. F. Prichard, S. J. Fowler and W. H. Snow.

COMMITTEE TO NOMINATE OFFICERS.

Following a motion by Mr. McGregor the President appointed Messrs. H. A. Allyn, J. A. Gould and Walter F. Norton a committee to nominate officers for the ensuing year.

MR. SHELTON ON THE PROPOSED INDEXING BY THE WESTERN GAS ASSOCIATION.

The President—Has any member anything to offer for the good of this Association?

Mr. Shelton—Mr. President and Gentlemen: I think the President must have expressed that purposely, because he knew that I wanted to bring before this Association something that I think will appeal to you as for the good of the membership of the Association. I refer to a work that has been started in this past year by the Western Gas Association, and which has been sufficiently broadened in its scope so that the members of the various Gas Associations can, however, share in the benefits of it. About a year ago the library bequeathed by Mr. George Treadway Thompson to the Western Gas Association was put into the hands of a committee, with the idea that that committee should, on it as a nucleus, build up and create a definite source of reference on all gas subjects that have appeared in print. It was felt further that the greater portions of gas subjects of a practical working nature are the articles that appear in the several gas journals in England and in America. It was felt logically that no reference source of information would be adequate as a practical working thing unless it had an index of such and the various articles that have appeared in print upon any gas topic of any moment. The committee of the Western Gas Association has, therefore, undertaken to prepare an index of all principal and current practical gas literature. You can see that that is a rather comprehensive, broad and ambitious work. It was then decided to make that index of such a character that the various subscribers to it of the Western Gas Association could get duplicate copies of it. It would do the membership very little good to have an index of what was available in the way of information in printed matter in New Albany, Ind., if they could not get there or could not find out what was contained in the index. Going a step further, it was decided to make that record in *duplicate printed form* of "card index" character. In short, the work has advanced far enough to assure the completion of 100, 150 or 200, as the case may be, complete sets of card indexes of all the practical articles on gas. I think you will agree with me that the great trouble in our working system of back papers is that we forget what has been brought out. For instance, I just happen to remember that 10 years or more ago Mr. H. C. Adams, of the Westmoreland Coal Company, wrote a splendid paper upon gas coal in the United States. I venture to say that not one out of ten happens to remember that, or would know where to find it; and in looking up the subject of coals from the standpoint of sulphur contained, or any other point, that information on hand and in print would be secreted and not brought to the fore to do us present good. The purpose of this index is to catalogue exactly those various past articles and make it easy for the members to turn to their box on top of their desk and find a complete set of reference cards to all the principal literature that has been printed. It has been estimated that each set will comprise about 6,000 cards, spread over 3 years, that the subscribers to this work will each 90 days receive 500 cards of a character like these samples, which I will distribute to you to illustrate the idea more clearly—that they will duly add those 500 cards to their set, and in looking up any subject will simply turn to their box, run through the tab index cards and simply pick out, it may be, for instance, on "station meters," perhaps 20 references, the foundations for meters, the construction and the design, or care of, or anything about meters. They will then turn to their files of the gas journals, and in the proper number get the information at hand. I think you can appreciate the benefit of having such a mass of information so easily at hand. Now, the Western Gas Association, naturally, having resources and income about the same as other Associations, is unable to pay the entire expense of such a matter out of its treasury fund, and it, therefore, has invited its members to subscribe to these sets, and has also broadened its doors so that the members of other Associations, although not members of the Western, can nevertheless subscribe to this index of gas literature. It believes that the more subscriptions that are received the better will the work be done, the more thorough the larger the index will be that is received. It has been asked me, as one of the committee in charge of that matter, to bring it before your attention, so that those of you who are interested can get from me the information on that point. Those who care to subscribe to it may send their communication to Mr. J. W. Dunbar, the Secretary of the Western Association, or to me, and commence to get the index the 1st of next May, when the first delivery will be made. I think a consideration of it will make you feel that it is a work of benefit to all the Associations, to all the members, to have this information in convenient, accessible form, and the cost of it, ranging according to the output of the gas companies, from $10 to $50 a year, based on a sliding scale, will put it within the reach of any of those who are earnestly and sincerely desirous of getting all the information on any particular topic that may be of moment or importance to them for the time being. This work—let me make it very clear—is purely a labor of love. The committee have no object or purpose other than simply to get this information in hand for the benefit of the gas people of the Western Association and their friends. These sample index cards are an illustration of the form of a station meter reference. They are under the heading of "station meters." The title of a paper is given, "Design and Construction of the Station Meter," the author, the date, the character of it, whether it is long or short, whether illustrated, whether a detailed or general article, and all the journals in which it can be found. I think you will appreciate that any person having a block of 6,000 reference cards covering the past 20 years and all current literature, and covering 100 or 150 different *subjects* in the gas papers, with from 20 to 100 references on each subject, will have all the practical references that he can use or that amount to anything. It is not expedient to go back more than 20 years into the dead wood of the past, or so far that few of us can avail ourselves of it.

On motion of Mr. Leach, seconded by Mr. McKay, a hearty vote of thanks was passed to Mr. Shelton for his clever and interesting explanation of the scheme and purpose of the card indexing system proposed by the Western Gas Association.

AN EXPRESSION OF SYMPATHY FOR CAPT. WHITE.

Mr. McGregor—Mr. President, I think it is very proper and becoming on the part of this Association to express our sympathy with Captain W. H. White in the loss of his estimable wife. Captain White was always the first to come forward with comforting words for members in affliction. He was the first to see that the families were provided with resolutions. I move you, therefore, that the Secretary and Mr. McKay be named a committee of two to express to Captain White our appreciation of the great loss that he has sustained.

The motion was adopted by rising vote.

ROLL CALL.

Active.

Addicks, W. R., Boston, Mass.
Africa, W. G., Manchester, N. H.
Alden, G. A., Watertown, Mass.
Allen, B J., Allston, Mass.
Allyn, H. A., East Cambridge, Mass.
Anderson, W., East Boston, Mass.
Barnum, D. D., Worcester, Mass.
Bartlett, L., Cottage City, Mass.
Burritt, D. F., Rockville, Conn.
Bush, R. W., Brooklyn, N. Y.
Coffin, J. A., Gloucester, Mass.
Coggeshall, H. F., Fitchburg, Mass.
Cooper, A. F., Exeter, N. H.
Cowperthwaite, G. E., Danbury, Conn.
Coyle, P., Charlestown, Mass.

Crafts, H. C., Northampton, Mass.
Dickens, J., Newburyport, Mass.
Dickerson, A. T., Rockville, Conn.
Erhard, T., East Cambridge, Mass.
Fowler, S. J., Charlestown, Mass.
Gifford, N. W., New Bedford, Mass.
Gillette, S. E., Danvers, Mass.
Gould, J. A., Boston, Mass.
Goulding, N. O., Natick, Mass.
Harbison, J. P., Hartford, Conn.
Hassett, E. J., Beverly, Mass.
Hintze, T. H., Lowell, Mass.
Humphreys, C. J. R., Lawrence, Mass.
Humphreys, J. J., Jr., Worcester, Mass.
Jenks, Z. M., Woonsocket, R. I.
Jennings, F. W., South Framingham, Mass.
Kelley, H. H., Waltham, Mass.
Lamson, C. D., Worcester, Mass.
Leach, H. B., Taunton, Mass.
Learned, E. C., New Britain, Conn.
Learned, W. A., Newton, Mass.
Learned, C. A., Meriden, Conn.
Leonard, C. F., Fall River, Mass.
Macomber, G. E., Rockland, Me.
Macmun, G. F., Marlboro, Mass.
Manchester, G. L., Easthampton, Mass.
Mansfield, G. W., Salem, Mass.
McGregor, W., Pawtucket, R. I.
McKay, W. E., Boston, Mass.
Mooney, E. B., Brockton, Mass.
Morrison, H. K., Concord, N. H.
Morse, C. W., Amesbury, Mass.
Moynahan, J. F., Stoneham, Mass.
Nettleton, C. H., Derby, Conn.
Norton, H. A., Boston, Mass.
Norton, W. F., Nashua, N. H.
Norton, P. T., Nashua, N. H.
Nute, J. E., Fall River, Mass.
Nutting, C. H., Chicopee, Mass.
Prichard, C. F., Lynn, Mass.
Richardson, F. S., North Adams, Mass.
Shelton, F. H., Philadelphia, Pa.
Sherman, F. C., New Haven, Conn.
Slater, A. B., Providence, R. I.
Slater, A. B., Jr., Providence, R. I.
Snow, W. H., Holyoke, Mass.
Spaulding, C. F., Waltham, Mass.
Spaulding, C. S., Newburyport, Mass.
Spaulding, W. H.
Spear, J. N., Boston, Mass.
Stearns, W. M., Waltham, Mass.
Stone, A. F., Chelsea, Mass.
Tilton, D. D., Newburyport, Mass.
Todd, J. R., Revere, Mass.
Travis, F. M., New Haven, Conn.
Walker, W. L., Fitchburg, Mass.
White, C. E., Wakefield, Mass.
Willard, A. T., Greenfield, Mass.
Wood, W. A., Boston, Mass.
Woodward, R., Pittsfield, Mass.

Associate.

Barnes, A. M., Cambridge, Mass.
Brown, F. H., Waltham, Mass.
Browne, A. P., Boston, Mass.
Cheney, H. N., Allston, Mass.
Coburn, C. M., Chelsea, Mass.
Davis, F. J., Waltham, Mass.
Dunbar, A., Brookline, Mass.
Gardiner, W. H., Jr., Boston, Mass.
Hinman, C. W., Charlestown, Mass.
Holmes, R. E., Winsted, Conn.
Humphreys, F. W., New Haven, Conn.
Mace, F. W., Lynn, Mass.
Macmun, G. F., Jr., Pawtucket, R. I.
McKenney, W. A., Boston, Mass.
Nichols, W. B., Roxbury, Mass.
Norton, A. E., Boston, Mass.
Scranton, G. H., Derby, Conn.
Thomas, F. W., Boston, Mass.
Tufts, J. P., Boston, Mass.
Waldo, J. A., Boston, Mass.
Wardwell, W. R., Boston, Mass.

READING THE PAPERS.

The President announced that the next business in order was the paper list, and called upon the Secretary, in the unavoidable absence of the author (Mr. George F. Goodnow, of Waukegan, Ills.) to read the following paper entitled

DISTRIBUTING ARTIFICIAL GAS AT HIGH PRESSURE IN A SUBURBAN LOCALITY.

Previous to the year 1900 the idea of distributing artificial gas under pressure exceeding $\frac{1}{10}$ to $\frac{1}{2}$ of a pound had been worked out very little. At the June, 1899, meeting of the Western Gas Association, and at the February meeting, 1900, of your own Association, Mr. F. H. Shelton called the attention of the gas fraternity to this idea of transporting gas from one town to another at 20 pounds pressure, and in that way supplying holders and from these holders distributing gas in the ordinary way. Such holders being already in existence furnished a ready means of demonstrating such a project, and a reference to his paper will show good reasons why such a method can be instituted. The idea has been developed further by Mr. Shelton, and several others, to distribute to distant centers of population, by use of a regulator, to reduce the pressure to ordinary burning pressure without the intervention of a holder, and still farther to run with high pressure service pipes into the premises of the consumer and reduce the pressure at this point with individual regulators to the pressure best adapted for burning. The last two are the methods which have been used by the North Shore Gas Company in the suburban district supplied by its pipes.

This territory begins about 18 miles from the north city limits of Chicago, on the West Shore of Lake Michigan, and extends north about 16 miles, comprising a chain of 6 towns; also the military reservation of Fort Sheridan. In 1898 a gas works of the ordinary type, with ordinary cast iron distributing mains, was built in Waukegan, and the plant is situated about half-way between the north and south lines on the lake shore. In August, 1900, the construction of a high pressure line, extending southward through this chain of towns, was set on foot, after inspecting two or three installations of this kind near Philadelphia, then in their first year of operation.

The aggregate population of these towns, according to the last census, is about 17,000, and some intervals occur between these towns of 2 or 3 miles, with only an occasional farmhouse along the country road through which it runs. The largest town is a manufacturing center of some importance, while the other towns and villages are comprised of suburban residences of Chicago people, with only a few small stores and markets to supply their needs, so that in these towns the sale of gas is very largely confined to domestic purposes for fuel and light. The manufacturing plants in Waukegan are extensive establishments which are lighted by individual electric plants, so the market for gas in this direction is limited.

The character of the soil is uniform throughout the greater part of this line, and consists of a yellow, sandy clay extending as deep as the pipe is buried with a cover of 3½ to 4 feet. The line is over 14 miles long, exclusive of branches, and is constructed of 4-inch "line" pipe, which is about 10 per cent. heavier than ordinary merchant pipe, with screw joints, recessed couplings and taper threads and valves of special construction; expansion joints were used at intervals, and bends instead of fittings were used to turn all angles. Two district regulators were installed in two centers of population, and the distribution pipes from these joints used were of the ordinary variety for low pressure gas, while in the other towns the consumer is supplied directly from the high pressure mains through their branches at the same pressure as the main line, and the pressure controlled by individual regulators before each meter or group of meters.

The discussion of the relative cost of distributing mains with low pressure under the ordinary practice, and high pressure to the extent we are using it, would be well worthy of being used as a subject for a separate paper, with details and careful estimates or, rather, figures of actual construction expense for carrying capacity and similar efficiency under the two methods. But in the large part of our territory the conclusion was quickly reached, as the cost of low pressure installation would be practically prohibitive, and could not be supplied at all under such conditions, while with the high pressure distribution a good territory could be developed at moderate cost. For instance, a 2-inch line was recently run, 3,000 feet in length, in a district containing large country residences with ample grounds and the houses far apart, but with the prospective average consumption very high. We do not expect more than 6 meters to be set on this branch, but considering our investment we expect it to be profitable, as similar lines the past season have shown satisfactory consumption. Services in this territory have been run from 200 to 700 feet in length, of ¾-line pipe, and it has been our practice to lay this size for all ordinary services. We do not consider it advisable to lay smaller pipe, although the carrying capacity would be ample; but for stiffness, durability and strength we use this size. The service connection is made with special fittings and especially devised tapping tools. A round-way cock is put in at the main, the gas shut off and the service laid and tested; a curb stop with box is put in to be used in case of fire or accident. Another service cock with small bore is put at the end of the service. This can be shut off in case of derangement of the regulator, and the small bore in the barrel would not allow an excessive amount of gas to escape under large pressure, even if the pipes were broken beyond this point. The regulator is then connected; this is of the diaphragm type and easily reduces the pressure from 5, 10, 20 or 30 pounds, as the case may be, to $\frac{3}{10}$ water pressure; 200 or more now in use have demonstrated the reliability of the regulators. Between this point and the meter or meters, as one regulator may be used for a group of meters if necessary, is placed a seal filled with cold-test oil which communicates with the outer air. In case the regulator should become deranged the gas would blow outside, relieving any excessive pressure on the meters or house pipes. An automatic cut-off has also been devised which will shut off the service before the regulator, in case the pressure beyond the regulator becomes excessive, thus doing away with the seal and consequent loss of gas. Similar arrangements on a larger scale are used for district regulators and have been found efficient and reliable. Our district regulators are in duplicate, and can be changed almost instantly from one to the other in case of derangement or need of cleaning. It is, however, the conclusion of the writer that, in this kind of territory, if the work were to be done over again, in view of our one year's experience, all the pipes would be made high pressure and the regulation individual. Much cost of construction would have been saved and the efficiency and reliability not impaired.

Two drips have been put in within the first half mile, and almost the entire condensation is taken out at this point, simply by turning an ordinary stop and waste placed below the surface out of the reach of frost, and allowing the condensed water with some oily matter to blow out until the main is free. A number of test drips beyond these points have been made, but scarcely any condensed liquid has been found.

No holders have been built away from the works, and since the gas

was turned on, February 11, 1900, the supply has not been discontinued, and during some very cold weather, in the past December and January, not a high pressure service has been stopped by frost, although such stoppages in our low pressure system in Waukegan have been numerous. However, between the two drips above mentioned, and about 1,000 feet from the gas works, this 4-inch main passes over a stone culvert, with less than a foot of cover for about 100 feet, and thus lies in frozen ground. A greater part of the condensed liquid passes through this portion and is blown out at the drip beyond. In the first half of December a week of extreme cold weather occurred, and rather mild winter weather until the middle of January. During this time of 4 or 5 weeks this main was gradually accumulating ice, and finally became nearly choked with it about January 10th, when trouble in pressure at the lower end became manifest. By tracing back with pressure gauges this trouble was located before any serious stoppage in the supply occurred, and after thawing the ice and blowing the drip beyond no further difficulty has been experienced; and it does not appear that any such trouble will occur at any great distance from the works, because all the water appears to be condensed, and the gas is almost completely dry beyond these points, as demonstrated by the absence of frozen services. No special protection has been given to these services to guard against frost, and many are quite shallow in the ground and exposed at many points.

This experience has taught us that the first mile or so of line after compression must be thoroughly protected from frost, because this portion contains continually a comparatively large amount of condensed water vapor; therefore, such portion of the pipe should be covered deeper and protected with more care than any other part of the line

Much has been said in regard to decrease in candle power occasioned by this compression throwing down the illuminants contained in the gas. No such diminution has been noted, as the ordinary flat flame burner looks to be as high in illuminating value 15 miles away at the end of the high pressure system as it does in our office on the low pressure system. A test, crude perhaps, but still of some value, was made with Jones' photometers. Two of these were adjusted exactly alike, side-by-side, on the low pressure system, in Waukegan, and one of them was carried without disturbance to the end of the high pressure pipe line, 14 miles away, and no change was observed in the indicated quality of the gas, and a series of readings, covering several days, shows very little difference in the two instruments. The gas made is about half coal and half water gas.

The uniformity of pressure is shown by daily cards from the Bristol gauge, which seldom show a variation greater than $\frac{2}{10}$ of an inch through the 24 hours. This uniformity of pressure shows marked results in the little damage and long life of mantles and absence of smoky mantles. This is a condition of things that we notice continually, having the two systems of distribution for a comparison.

The ability to use gas at a higher pressure for fuel by simply adjusting a governor has been found useful, and the efficiency of gas burned under 8 or 10 inches pressure has been demonstrated to be much greater per cubic foot than that burned under 3 inches pressure. Some experiments have also been made, where mantle burners directly on the high pressure show a wonderful increase in the brilliancy of the light, but no data can now be furnished as to the consumption of the gas.

The compression is secured by direct-acting, Rand steam compressors, the gas piston on the opposite end of the piston rod from the steam piston. These have been adapted from ordinary air compressors of this type. In our plant they are in duplicate, one is used in the morning and the other in the evening. At the present time we are running from about 7 o'clock in the morning till 12 noon, and from 4 or 5 until 12 at night, about 10 to 14 hours per day. The elasticity of the gas in the mains, which contain 7,000 to 9,000 feet of gas, furnishes the supply during these intervals when the compressors are not running. From 12, midnight, until 5 o'clock in the morning, the fall of the gauges is only 4 or 5 pounds.

The subject of storing gas under pressure in tanks at intervals along the line was considered but abandoned, temporarily at least, and our year's experience has not shown the need of such storage. The cost of compression has been estimated to be about 2 cents per 1,000 cubic feet, but this could only be estimated as the steam was secured from the boiler in use for other purposes, and the attention necessary for these machines is very little. Compressors driven by gas instead of steam seem feasible to the writer, but investigation has not been complete enough yet to warrant a recommendation, and he has had no experience with their use.

The amount of gas which can be supplied through this line which we have built was the subject of a good deal of speculation and theorizing, and it was computed that 12,000 to 15,000 an hour was delivered at the terminus with a loss of 20 pounds pressure; that is, having an initial pressure of 30 pounds, this amount could be delivered at the other end at a pressure of 10 pounds. The use of gas on the line has not, however, up to this time been large enough to demonstrate this or prove it false, but from 40,000 to 50,000 feet per day have been sold within the last 2 months off this line, and a decrease in pressure of not over 3 pounds has been shown at any hour of the day between the gas works and the terminal, 14 miles away at Highland Park, and this difference occurred between 6 and 8 o'clock in the evening; at other times the difference varied from nothing to 2 pounds, thereby demonstrating that this line has a capacity of much more than 100,000 cubic feet per day; and I venture to say that at the hour of greatest consumption the line could deliver 15,000 cubic feet per hour with an initial pressure of 30 pounds, because the elasticity of the gas in the line at a decreasing pressure would furnish an additional supply of 6,000 or 7,000 feet, but inasmuch as the supply is taken off at irregular intervals from the first mile to the last, the capacity would be even more than this, and I think a safe estimate would not be under 15,000 feet per hour.

In this territory, of much scattered population of about 7,000, we began setting meters about the 1st of April, and the 1st of January in that part 440 meters and 80 street lamps were being supplied from this line. Of this number 230 were controlled by two district regulators, and consequently do not differ from those supplied from ordinary gas mains, but as 210 are supplied direct from high pressure mains with individual regulators, thus we have an excellent means of forming an intelligent opinion about district and individual regulators; and, as I stated, the reasons why we have concluded to make our extensions next year chiefly with small high pressure pipes and individual regulators. When I say that we expect to supply next year through branch lines two golf club houses, two groups of university and academy buildings, the barracks and quarters on a military reservation and one or two hotels, each of these distant from 1,000 to 3,000 feet from our present mains, the utility of this method of distribution becomes apparent, and careful consideration of the cost of this construction leaves us in no doubt that such extensions will prove profitable. We expect to carry an ample supply of gas to these points through 2-inch and 1¼-inch pipes. The life of these pipes can only be estimated by the experience of natural gas companies and those artificial gas companies that have used wrought iron pipe for small mains and services, but all of these examples point to satisfactory longevity.

Electrolysis is a trouble that we expect to encounter, but at this time we can only conjecture the gravity of the situation. Whether it will be worse or better than with ordinary gas mains we will be more competent to judge another year than at this time.

Some of the street lights above mentioned are being operated from low pressure mains, controlled by district regulators, and have mantle burners which are working in a very satisfactory way. A part of the street lights are being controlled by small individual regulators, located in the bottom of the posts. We are also experimenting with some controlled by valves, but no regulator immediately under very small orifices supplying the Bunsen tubes of mantle burners. We think these burners will be successfully operated, and they certainly give a brilliant light.

Constant observation of this method of distribution leads to speculation regarding the field of operation and the use to which it may be put. Large cities and towns may be girdled with high pressure mains, and district regulators branched off to feed existing low pressure mains at points where the supply is inadequate, and much expense be saved in construction of large feed mains, and a much more even distribution may be maintained; also, extensive outlying holders can be dispensed with, or the necessity of building such be eliminated.

The reason does not appear why coke oven plants or other cheap methods of manufacture cannot be located near coal fields or near navigable waters, where cheap coal or oil may be secured and the product piped long distances under high pressure to centers of population.

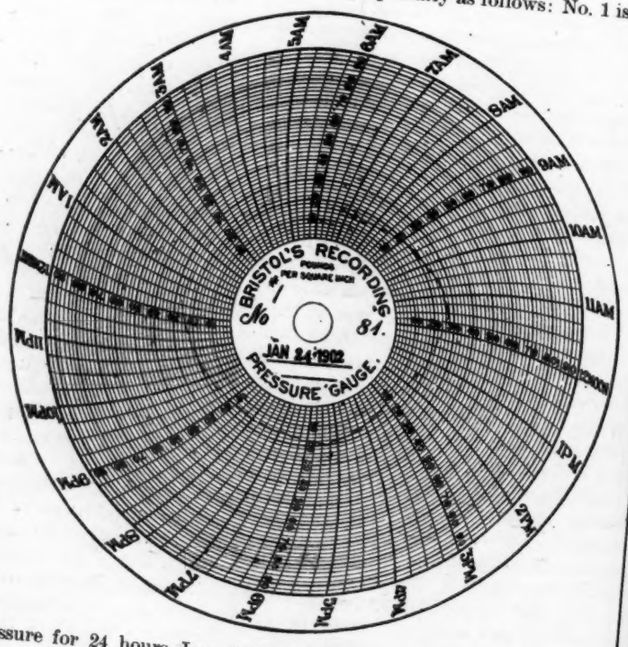
The extent of compression has not yet been determined, and whether 30 or 50 or 100 pounds is the limit only careful study and experiment can demonstrate; but that 25 or 30 pounds will not commercially deteriorate the quality of the gas for lighting or heating purposes I feel confident. I hope to make determinations of this kind with the calorimeter and photometer in the near future; also, after higher compression if possible.

In explanation of the table, the second column is the pressure in pounds as indicated on the Bristol gauge near the compressor at the gas works opposite the hour named, while the third column is the pressure indicated by Bristol gauge at the same hour at Highland Park, 14 miles south.

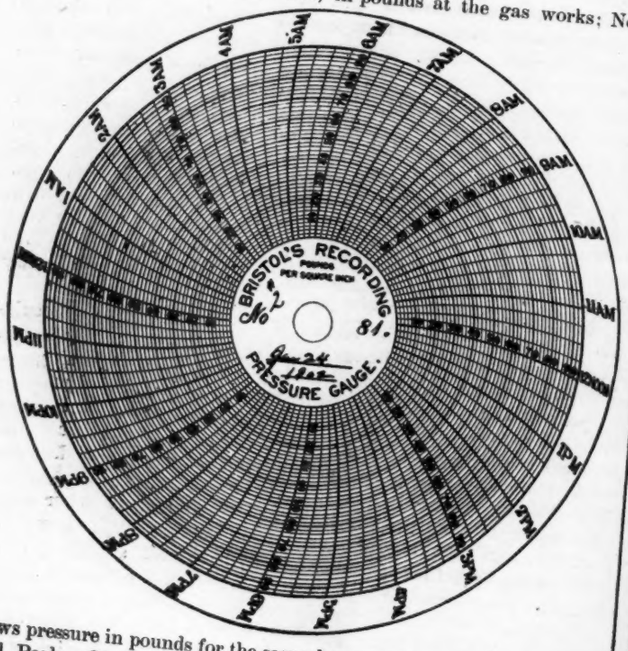
January 14, 1902.

	Works.		Highland Park.
12 midnight,	24	pounds,	24 pounds.
3 A. M.	24	"	24 "
9 "	16	"	14 "
12 P. M.	22	"	20 "
3 "	22	"	22 "
6 "	15	"	12 "
7 "	15	"	12 "
8 "	16	"	14 "
9 "	17	"	16 "
10 "	19	"	18 "
11 "	20	"	20 "

The charts here illustrated show graphically as follows: No. 1 is the

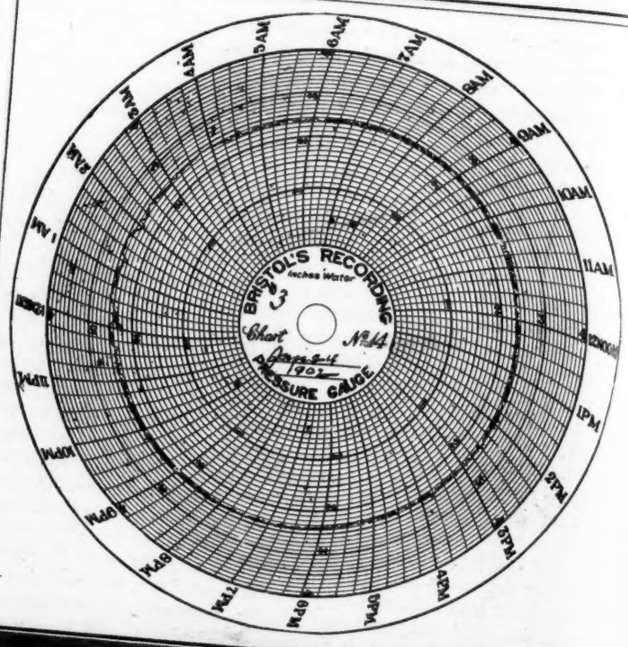


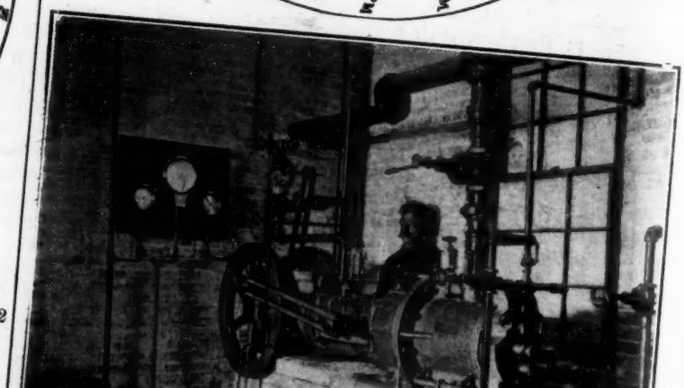
pressure for 24 hours Jan. 24th, in pounds at the gas works; No. 2



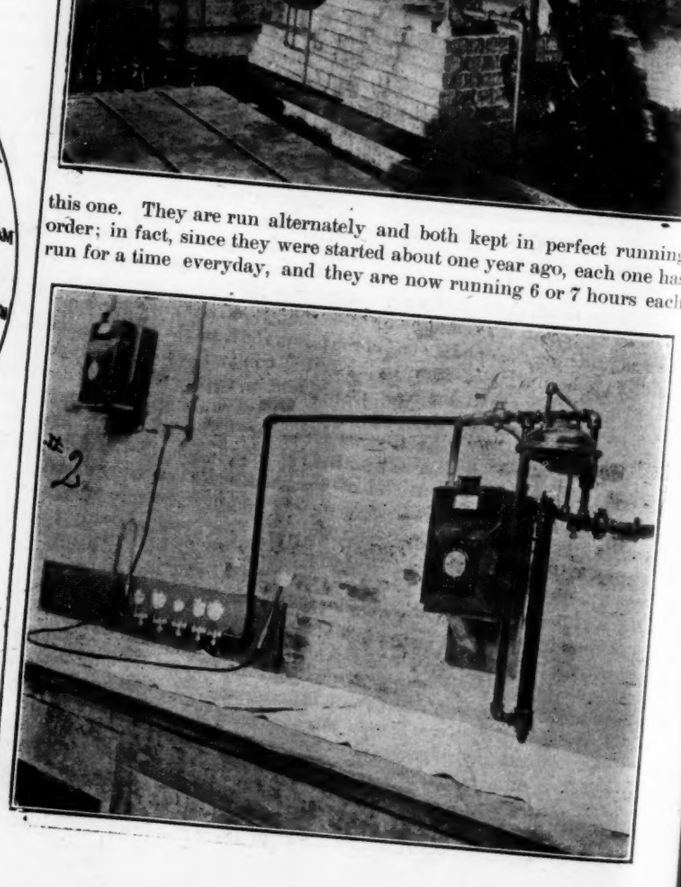
shows pressure in pounds for the same hours on the same date at Highland Park. Our Bristol gauge is situated just before a regulator. Chart No. 3 is taken from a Bristol gauge immediately after a district regulator, and shows the pressure in inches of water for the same 24 hours.

Photograph No. 1 shows a Rand compressor situated at the gas works, and fed by a separate outlet from the distributing holder. It has a nominal capacity of about 9,000 feet per hour, running 140 revolutions per minute. A duplicate of the machine is situated just at the right of





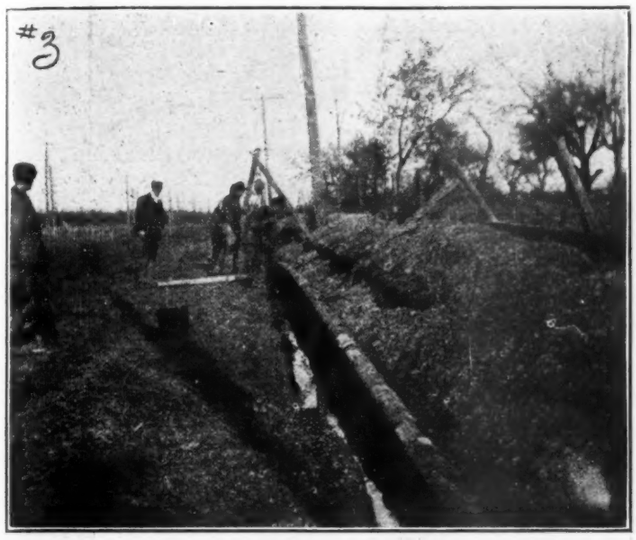
this one. They are run alternately and both kept in perfect running order; in fact, since they were started about one year ago, each one has run for a time everyday, and they are now running 6 or 7 hours each



per day, and neither of them has received any repairs beyond cleaning the poppet valves in the cylinder.

Photograph No. 2 shows the regular equipment put before each gas meter, which has already been described, and shows 5 gas jets burning under a water pressure of 2½ inches, while the pressure before the regulator on a gauge not shown in the picture indicates 24 pounds.

Photograph No. 3 shows a gang of pipe men lowering a 4-inch main



into the trench prepared for it after the same has been coupled up on the bank and found tight under an air pressure of 60 pounds, and the amount of pipe so put together and ready to be lowered may be 1,000 feet or more, as it bends and can be handled very much like a long line of large hose.

Discussion.

The President An interesting paper, gentlemen. We are all very sorry that Mr. Goodnow could not be with us. He once took quite an active part in the affairs of this Association. I will call upon Mr. Shelton to make a few remarks upon this subject.

Mr. Shelton--Gentlemen, you can appreciate that it has been very pleasant indeed for me to find this paper brought forward. I have taken a good deal of personal interest in the success of distributing gas at high pressure on the lines that I advocated in theory three years ago, and had the opportunity to demonstrate two years ago, and which plan has been operating successfully since from the initial time of construction. I have had occasion to build several lines since that time, and they all have continued to work from the word "go" with entire satisfaction. The line built by Mr. Goodnow in Waukegan is one of the longest, in that it is 14 miles long; and it is only 4-inch pipe, working under 20 pounds pressure. It has not any gasholders on the outside; it is dependent upon the behavior of machinery, the behavior of the regulators. I think you will agree he has given a most practical running description of it and of its details of operation. He has not stumbled across a thing, except a little freezing at the beginning of the line where it was inadequately covered, which I think is a very small discredit or trouble in operation, compared with the manifest entire success of the long distance delivery which is shown in this paper. He has given us an easy, interesting, open, frank description of this novel installation in that section - the fourth or fifth of its kind in any section—and a description which completely bears out my belief in the beginning that such a line would work perfectly. It may interest you to know that high pressure, in the sense of distributing at 10, 15, 20 or 30 pounds, has not only come and come to stay, but is growing and growing rapidly. There are nine lines in operation already. The original line built by me at Phœnixville, Pa., was two years ago in use. The next line, at Darby, near Philadelphia, 8 miles long, now has 25 or 30 miles of high pressure pipe, feeding 1,000 or more customers—it is in a scattered suburban district, each with a house regulator perfectly doing the work. We don't have 1 in 500 to trouble us. The next line, 3-inch, was built from Riverton, N. J., to push gas over to Moorestown, a small town of 3,500 people, 4 miles back, which never would have had gas if it had had to have its own works. The next line was to push gas from Riverton to Riverside, a small town of 2,500 people, where they picked up a few hundred people, who never would have had gas if it had not been for high pressure to get it to them. The next line was built by one of your members, Carl Graf (long at Lawrence, Mass., and the last few years at Hackensack, N. J.), who, by a line of 6 miles long, of 5-inch connecting pipe, has been able to shut down an adjoining works at Rutherford, which the Company purchased, and operate all their business from one station. At Rockaway—within the limits of Greater New York—the Rockaway Beach works has connected up to the Far Rockaway plant, shut down one station and consolidated everything at one point, at an investment of about $15,000 for connecting pipe line, etc. You can readily see that the interest charge on that line is far more than offset by the saving in consolidating the manufacture at one works. Mr. Goodnow has described his Waukegan line of 14 miles in length. There is another small line in Illinois, near De Kalb, taking gas from one town to another, the name of which I now forget. A new plant at Dover, N. J., under the direction of Capt. Wm. Henry White, Constructing Engineer for the Company, is arranging, and has put in part of the equipment, to push gas to Rockaway and Port Oram, two adjoining towns. I think you can see from this enumeration that high pressure is evidently doing the work of satisfactorily pushing gas from the point where it is made to the point where it is wanted. At least half a dozen other lines are under consideration of which I have knowledge, that will probably be built this summer, one of them to be 30 miles long. In other words, practice has proved that there is no logical reason why the theory of compressing gas to a number of pounds does not work beautifully, commercially, enabling you to cut down your expense in pipes enormously and yet get perfect satisfaction in your delivery. There are four distinct ways in which you can apply this high pressure work: First, to couple up two works that the same interest may own and concentrate the manufacture in one station; second, for getting gas into some small town adjoining or near by, which otherwise could not afford to have its own gas works; third, for covering a suburban territory where the mileage is so great that to run a 12 or 16-inch backbone through a long, scattered district would be impossible or prohibitive from the financial standpoint; and, fourth, the obvious application of high pressure to "boost" low pressure mains that are overtaxed. An installation of that sort is under construction now in New Orleans, La. At that point there are some 200 odd miles of mains, starting with 20, 16 and 12-inch pipes from the works. There has been a tremendous lot of new business added there in the last 8 months. The new mains are overtaxed. We have been confronted with the question of how to get the gas, that we can make readily at the works, to the point where we want it (1, 2, 3 and 4 miles away from the works) throughout the city. The lowest estimates of cost for a 24-inch new trunk-line main exceeded $100,000 considerably. I decided to put in a high pressure boosting system, 8 miles in aggregate length, running to 5 different points in the town, starting from the works with 6-inch, and running 3 miles thereof in one direction, with a couple of 4-inch laterals to intermediate districts, and running 2 miles of 6-inch in the other direction from the works, with one 4-inch lateral, making 5 points around the city to which gas at high pressure is "short-circuited" or shunted from the works to where it is wanted and then put into the low pressure mains. That 8 miles of pipe, laid bottle-tight, screw steel, coated and doubly coated (to make its longevity the utmost), and the pumping plant, the regulators—the "whole shooting match," if I may so express it—will cost us under $50,000. So that, even with a cost of a cent or two for compression and pumping the gas, we still are ahead of the interest charges, and we don't have to find the money for the otherwise additional investment! I think it is pretty evident from what I have said about these high pressure lines, which are matters that are getting to be more and more known in the gas community, that high pressure is a very useful plan for a great many things, and especially in the direction of relieving overtaxed mains. It is simply absurd, almost; the capacity of a little pipe working with gas at 10, or 15 or 20 pounds pressure. One company operating that way has a run of ¾-inch pipe, 2,200 feet long. It feeds a factory that makes drugs, vaccine points and pharmaceutical specialties. They have been running overtime lately because of smallpox. ("'Tis an ill wind that blows nobody any good.") They have been using twice as much gas as they ordinarily do. They have 40 or 50 little glass blowing machines on which they work and draw the tubes in which the drugs are put up. They have no particular heating arrangements. They have 40 or 50 girls working in a large room, and on chilly days they heat by a lot of small stoves—gas heating radiators. We recently sold them a gas engine. We have kept piling on business after business until their bills, which started at $25 a month, now range between $100 and $200 a month, and they feel that we will wind up as proprietors of the drug factory, if we keep on. That little ¾-inch pipe, 2,200 feet long and over, is supplying the "whole shooting match"—again if I may express it—and does not seem to be groaning a particle. We have been surprised.

It knocks all theory and all formulas sky high. If you figure the theoretical capacity of a small high pressure pipe and then double it you will find that you can do it. That is a very loose statement of my observation in the last two years in working with these convenient high pressure tubes. In commenting upon three or four points of Mr. Goodnow's paper I only want to differ with him on his conclusion that all house services might best be covered by individual regulators. I don't think that that is proved, nor necessarily follows. A great deal is to be said on both sides. If you have a high pressure system throughout your city, town or suburban district, or whatever it may be, you undoubtedly have a magnificent advantage for getting high illumination by pressure. You can get 6, 8, 10, 20, or any number of inches pressure for incandescence of mantles, and on mantles 6, 8 and 10 inches long, if you please to use them. You can get results in gas stoves that are superb. But you have manifestly 1,000 regulators to look after, to pay for, to attend to, vs. one district regulator. And a good many other points can be adduced on either side of the argument. I think it is a question of local condition whether one should use a district regulator, and cut down the gas to the ordinary low pressure practice, or put an individual regulator in each house. Notice particularly that Mr. Goodnow has no outlying holders of any sort; the only holders that he has are in his gas works. The gas is made and conveyed 14 miles away and delivered all along the line, and he has not a holder in the place excepting at the starting point. The necessity of not having outlying holders I think has here again been absolutely demonstrated. Another advantage in this high pressure work is that you get a greater *uniformity* of pressure than under the ordinary conditions. The variation is only a tenth or two of pressure the 24 hours around. You get less blackening of mantles and less irregularity in burners and stoves. You get a more uniform pressure at the house, which has been the ideal of the gas man to secure, but which is so difficult to get, with many customers of different sizes, burning at different times on a given set of pipes. High pressure almost eliminates the variation of local pressure. I think that the extent of pressure will remain within moderate limits; I mean 10, 15 or 25 pounds. I think the experience of the Pintsch people in compressing city gas through 200 pounds pressure for car storage shows that when you get into that range of pressures there is a distinct loss of candle power. We are doing pretty well as it is with 3, 4 and 6-inch pipes under 20 and 25 pounds pressure. We can get up to 30, 40 or 50 pounds, if necessity compels it in the future, and not have any great loss; but I think that the conditions will not necessitate for a very long time going beyond that, or that we need to consider or figure on other than the 10 to 25-pound range ordinarily followed. Note that at Waukegan they have run their compressors perfectly throughout the year and have not had the slightest difficulty of any sort. I can say that unqualifiedly also, in the half dozen high pressure plants that I have been directly connected with, while we have put in duplicate compressing machines as a matter of precaution we have never had to fall back upon them. The repairs have been merely the cleaning of a little valve, and we can easily arrange to lay off for an hour or two once a month just to take it out and look at it, rub it up with an oil rag and make sure it is in good condition. We have had no repairs, no slips, no troubles with the machinery; none of the bugaboos that it was promised we would have have materialized at all.

The President—Have you made any experiments in the flow of gas in your high pressure pipe system, and also in regard to the loss in candle power?

Mr. Shelton—We have made no experiments in the quantity of gas flowing through given size pipes; we have only observed the results after having gone ahead and put in our pipes. We figured, in the first place, as to the size of the pipes needed for a given capacity, by following in the main the practice of the natural gas people. They have handled great quantities of gas through long stretches of wrought iron pipe. Their experience has been that of 10, 15, or 20 years, now. Where they originally worked at ranges of 100, 200 and 500 pounds pressure they are nowadays working, especially in the cities, at ranges of a few ponnds pressure, and they have worked out capacities in all ranges to a fair degree of standard. We felt it was sufficient for us to adopt the general pipe sizes which are in use in Indiana and in the Pennsylvania region for the handling of given quantities over given distances of natural gas, the gravity being about the same. Of course, the amount of gas delivered in any given case would depend directly and absolutely upon the length of the pipe, upon the pressure and upon the size. No one condition could be laid down to fit the next place. As far as the testing of candle power is concerned, we have not made any specific photometric tests. It has simply been a matter of chance; it has not been easy for us to have the apparatus, especially available at both ends of the line. We have been pretty busy on other things. We have found no difficulty on the candle power question, and we have perhaps been negligent in not exhausting that particular point and seeing just where we landed upon it. But I can only say, as I have said before, and as Mr. Goodnow says in this paper, that there is no visible difference in the candle power at the other end of the line. If the compression "knocks down" certain illuminants the gas seems to pick them up again!

On motion of Mr. Shelton a hearty vote of thanks was passed to Mr. Goodnow for his paper.

[To be Continued.]

[Official.]

MINUTES OF THE NINTH ANNUAL MEETING, MICHIGAN GAS ASSOCIATION.

Held at Kalamazoo, Mich., February 19-20, 1902.

First Day, Morning Session.

The meeting was called to order, at 10:30 A.M., by the President, Mr. Paul Doty, of Detroit, who introduced Judge Mills, Mayor of Kalamazoo, who tendered the hospitality of the city to the Association. This was responded to by the President.

The President then read his annual address.[1] The message, on motion of Mr. Persons, was referred to a committee of three, to be appointed by the Vice-President.

An invitation to visit the State Insane Asylum was received from the Mayor, and accepted with thanks.

The President then introduced Mr. A. M. Freeman, Chairman of the State Tax Commission, who addressed the Association on "The Methods of the Commission on the Taxation of Gas Properties."

On motion of Mr. Eaton a vote of thanks was tendered to Mr. Freeman.

The President then appointed the following committees:

On Place of Next Meeting.—Messrs. D. H. Frazer, H. D. Walbridge and C. W. Tippy.

On Final Resolutions.—Messrs. A. G. Lloyd, J. J. Howden and Paul Challis.

Mr. Knight announced the Committee on President's Address as follows: Messrs. W. M. Eaton, J. T. Lynn and F. R. Persons.

An adjournment was then ordered.

First Day, Afternoon Session.

The meeting was called to order at 2:30 P.M. The Executive Committee submitted the following report:

To the Members of the Michigan Gas Association: Your Executive Committee beg to report as follows: They recommend that the Nominating Committee shall consist of Messrs. Sedgwick Dean, E. F. Gallagher and Fred. Howden. They recommend that the following be elected to

Active Membership.

T. Whalen, Supt. of Manufacture, Jackson (Mich.) Gas Company; Alva F. Traver, Student, Ann Arbor, Mich; J. B. Eaton, Inspector, Jackson (Mich.) Gas Company; Geo. C. Turner, Sec. Coldwater (Mich.) Gas Light and Fuel Company; Fred. Bowles, Supt. Hillsdale City (Mich.) Gas Company; Chas. Forbes, Supt. City Gas Company, London, Ont.; C. W. Tippy, Asst. Supt. Mfg., Detroit (Mich.) City Gas Company; Robt. S. Ray, Supt. Windsor (Ont.) Gas Company; Geo. M. Camburn, Supt. Adrian (Mich.) Gas Company; John Ginzel, Gen. Mgr. Wyandotte (Mich.) Light and Fuel Company; Benj. C. Robinson, Supt. Ypsilanti (Mich.) Gas Company; G. H. Hubbard, Supt. Distribution, Ann Arbor (Mich.) Gas Company.

Associate Membership.

Harvey B. Auger, Salesman, Jas. Walker & Son, Detroit, Mich.; J. P. Conroy, Salesman, General Gas Light Company, Battle Creek, Mich.

They recommend that the following papers be presented to this meeting: "The Construction of Water Gas Plant;" by Mr. C. W. Tippy; "The Theory of the Incandescent Mantle;" by Messrs. A. H. White, H. Russell and A. H. Traver.

They recommend that the Committee on Scholarship, consisting of Messrs. H. D. Walbridge, W. M. Eaton, S. M. Dole, Paul Doty, J. T. Lynn and H. W. Douglas, be continued. (Signed) Paul Doty,
J. J. Knight,
H. W. Douglas.

On motion the report was adopted and placed on file.

1. See Journal, *ante*, page 259.

The reports of the Secretary and Treasurer having been read and adopted, Mr. C. W. Tippy read his paper on "The Construction of a Water Gas Plant," which was followed by the paper on "The Theory of the Incandescent Mantle," by Messrs. A. H. White, H. Russell and A. H. Traver. An excellent discussion followed the reading of the papers, after which the meeting was declared adjourned to the following morning.

SECOND DAY, MORNING SESSION.

The meeting was called to order by President Doty at 10 A.M. Prof. E. D. Campbell, of the University of Michigan, addressed the Association on "The Function of Original Research in a Technical Education," for which he was awarded a vote of thanks.

Mr. Walbridge, Chairman of the Committee on Scholarship Fund, reported that the Committee were exceedingly well satisfied with the work of the Scholarship, and recommended that the work be continued; that they further recommended that votes of thanks be tendered to the United Gas Improvement Company, for the presentation of a pentane standard lamp, and to the Welsbach Commercial Company, for favors and supplies for the use of the University in this work, and that the Secretary be instructed to convey the same.

Subscriptions were then called for and were received to the amount of $945.

NEXT PLACE OF MEETING.

The Committee on Place of Next Meeting recommended that Battle Creek be chosen, and the recommendation was adopted.

ELECTED TO HONORARY MEMBERSHIP.

The Executive Committee then made the following supplementary report, which, on motion, was adopted:

To the Members of the Michigan Gas Association: Your Executive Committee recommend that Prof. E. D. Campbell and Mr. A. H. White be elected to honorary membership in the Association.

PAUL DOTY, President.

REPORT OF COMMITTEE ON PRESIDENT'S ADDRESS.

The Committee on Presidents Address reported as follows:

To the Michigan Gas Association: Gentlemen—The Committee to whom the excellent address of your President, Paul Doty, was referred, beg leave to report as follows:

The address presents to the Association many subjects very pertinent to every gas manager in Michigan, and especially to the presidents and other executive officers of gas companies.

The subject of taxation is one no executive officer or stockholder can afford to overlook or neglect.

If franchises or their equivalents are to be taxed, the property investment under them should be protected; in other words, if a franchise shall pay the State, county and city a revenue from the earnings of money invested by cause of its provisions, then in return the franchise should be a protection to such investment against competitive companies as long as the operating company gives to the public equitable service and quality for the price charged.

We recommend that an extra effort be made to have several papers on "Management" at the next meeting The papers could be so arranged that towns and cities of different classes could be represented. We believe that the recommendation regarding a gas commission is a good one, and the only safety against unscrupulous adventurers making raids to obtain franchises in the larger towns, and eventually increase the burdens of the consumers.

The question of price (whether one price, or two prices, or a sliding scale) is, we believe, one of local issue, and no general rule can be applied. The table showing effects of different prices is very valuable.

We cannot recommend too highly the suggestion regarding profit sharing with employees of gas companies.

We would suggest a special vote of thanks to the President for the trouble he has taken to present the matter so fully to the Association. The address shows the expenditure of much time and research.

The Michigan Association should be proud that they have been so fortunate as to have had Paul Doty for their President.

(Signed) W. M. EATON,
J. T. LYNN,
F. R. PERSONS.

REPORT OF COMMITTEE ON FINAL RESOLUTIONS.

The Committee on Final Resolutions reported as follows:

To the Michigan Gas Association: Your Committee on Final Resolutions would respectfully submit the following:

That extreme pleasure is felt by all members of this Association at the hearty welcome and hospitality of the city extended by the Mayor.

That the thanks of this convention are due to Mr. Freeman, of the State Tax Commission, for his courtesy and very able and instructive address on such a vexatious problem.

That the thanks of the Association are due Mr. J. J. Knight, the Kalamazoo Gas Company, and the General Gas Light Company for substantial entertainment accorded all members.

That the thanks of the Association are due our able and efficient Secretary for the successful programme carried out, and to the President for the masterful administration of affairs and paternal interest shown.

(Signed) A. G. LLOYD,
PAUL CHALLIS,
J. J. HOWDEN.

ELECTION OF OFFICERS.

The Nominating Committee then reported as follows: We recommend the following for election to office for the ensuing year.

For President.—J. J. Knight, Kalamazoo.
For Vice-President.—S. Milo Dole, Adrian.
For Sec. and Treas.—Henry W. Douglas, Ann Arbor.

Respectfully submitted, (Signed) SEDGWICK DEAN,
E. F. GALLAGHER,
FRED. HOWDEN.

On motion the report was adopted and the Secretary was instructed to cast the ballot of the Association for the gentlemen named.

Letters of regret from the following were then read:

T. C. Jones, Sec. Ohio Gas Light Association; Jas. W. Dunbar, Sec. Western Gas Association; J. B. Grimwood, Sec. Pacific Coast Gas Association; H. H. Hyde, L. E. Walker, Arthur G. Fox and S. S. Stratton.

The Question Box was then taken up for discussion, after which the meeting adjourned.

SPECIAL ENGLISH CORRESPONDENCE.

COMMUNICATED BY NORTON H. HUMPHRYS.

SALISBURY, ENGLAND, February 10th, 1902.

Gas in General, and the South Metropolitan Gas Company in Particular.—Mr. Percy Griffith Reviews the Gas Industry.—A Practical Enthusiast.

The general feeling amongst those responsible for the financial management of gas undertakings, at the present time, is one of relief. The coal bill has been a terrible incubus during the last year or two, and while there have been previous experiences in the way of coal famines, in the course of which top prices have been reached, considerably in excess of those recently prevailing, the disease, if more acute, has been of shorter duration and consequently the effects have not been so trying. Lately we have been doing more for the coal interests than we have been doing for ourselves, but now there is a prospect of a return to something like normal conditions, and of an opportunity of replenishing depleted reserves and starved depreciation accounts. The moral that the majority will draw from recent events is that it is not wise to sail too close to the wind. Even now the price of coal is such as to present a wide difference from the conditions of 1897-8, and rates for gas based on those conditions are too low for comfortable working. The shareholders expect to receive the dividends sanctioned by Parliament, which in many cases fix the value and the price they had to pay for the property, under the auction clauses; the works and plant throughout must be properly maintained in good going order; and an adequate provision must be made for the depreciation of perishable articles such as gas stoves. Assuming that all these charges are to be met, on a fixed selling price, it is evident that the cost of materials and labor must be fairly regular. The selling price of gas is a bulky and cumbrous thing to alter, and though not so unwieldy as some have supposed, there are obvious reasons why it should be maintained at a steady rate with few and wide apart variations. Frequent changes are apt to be regarded as a sign of weak and vacillating management. So that altogether advice to the tune of selling at the very lowest figure consistent with meeting the above charges, will be received with some degree of qualification in future.

The present season has on the whole been fairly favorable to sales of gas and of coke, and decidedly more so than that of 1900-1. It has not been a markedly severe winter, but there have been a few cold spells that have not been without effect both on the gasholder and on the coke heap. So the reports for the second half of 1901, which are now just being issued, are of a more satisfactory and hopeful character than has been the rule for some time past. The report of the directors of the South Metropolitan Gas Company comes in for more than passing interest, apart from the established attractions due to the special characteristics in the management, because for the first time the subject of reduced illuminating power comes within the range of practical

working. At midsummer last, the fortunate customers of the South Metropolitan received a handsome concession in price, a reduction from 2s. 8d. to 2s. 3d. per 1,000 cubic feet, of which 2d. was due to the reduction of the standard from 16 to 14-candle gas. As a matter of fact, however, there has only as yet been a reduction of one candle, viz., from 16 to 15 and the article supplied is similar to that previously sent out except that it has not been enriched. Some authorities tell us that the effects of enrichment are more or less transitory, and, therefore, it may be that some of the customers get as well served as they were before. A sop of 5d. per 1,000 cubic feet will also have the effect of leading the consumer to be lenient in respect to slight differences of illuminating power, while the company are better off to the extent of ruling out the item for enrichment from the expenditure side of the revenue account. Two important points are evidenced in the report. The first is that the increased sales of gas during the half year are not more than normal. I have already remarked that the weather during the second half of 1901 was more favorable in respect to sales of gas than that for the corresponding period of 1900. But the increase in the South Metropolitan district was about the same as that experienced by other companies who have not been making any change. It has been urged by those who bolster up the photometer and insist on having their pound of flesh in the matter of candle power, that the illuminating power as shown by the photometer represents value to the consumer. To put the matter shortly, that if 17-candle gas is worth 2s. 10d., then 15-candle is worth half a crown. But the South Metropolitan consumers, while they have economized nearly 20 per cent. in the price of gas, do not appear to have experienced any inconvenience or sense of loss. The complaints we are told have been less than usual. Why this should be so is not very obvious. For it will scarcely be laid down as a general rule that the way to reduce complaints is to reduce the candle power. This experience leads one to observe that a change from enriched to unenriched gas, all other conditions remaining the same, is not of such a radical nature as that involved by substituting a cheaper and inferior class of coal. And it is quite as reasonable to question the value of enrichment to the consumer, as to accept as a fact the statement that he will hail a substantial reduction on the photometer with less complaint than usual. Another interesting feature in the South Metropolitan management is the fact that the demand for slot meters is not yet satisfied and that the Company follow on steadily and uninterruptedly with the addition of nearly 50 per working day. The total number of slot consumers now exceeds 123,000, of whom nearly 100,000 have cooking stoves. A staff of 90 collectors is engaged in this department, all of whom have been selected from the staff of the Company, and all of them are shareholders. This fact may have some connection with the large demand in this line, as 90 collectors, each one interested as a shareholder, could do a very respectable bit of canvassing. Apart from the slot question, it is an excellent feature that the collectors should be shareholders in the Company. These officials have opportunity for canvassing and prospecting new business that does not come to anyone else. In many cases they are the only representative of the Company that comes into actual personal contact with the customer.

It is always well to "see ourselves as others see us," although the "seeing" usually consists mainly of appropriating such portions of the survey as may agree with our interest or sentiment, and either quietly ignoring, or actually disagreeing with the remainder. And, therefore, some references should be made to the remarks of Mr. Percy Griffith, the President of the Society of Engineers, who, in the course of his inaugural address, found something to say about gas supply. He stated that the improvements in details of manufacture effected within the last few years would have been undreamt of 20 years ago, and that the reductions in the cost of making and purifying gas, the increased applications of gas for heating and power purposes, the enormous extension of gas business amongst small consumers created by the slot meter and free fittings system, and the more recent developments of incandescent gas lighting, both for internal and external purposes, were important features in regard to the advance of the industry. And he referred at some length to the progress of the incandescent system and to the question of incandescent lighting, and he urged upon all gas authorities the desirability of at once undertaking and extending this system. The time was past when responsibility could be said to cease with the delivery of reasonably pure gas at a statutory pressure at the consumer's meter, and no gas manager could hope to maintain or extend the success of his undertaking unless he was prepared to assist the consumers in making the best use of the gas after delivery. The recent practice of hiring out appliances and the rapidly extending use of prepayment meters afforded a groundwork for the extension of the internal supervision which was so desirable and in fact necessary. He also referred to high pressure incandescent lighting and the improvements effected by Mr. William Sugg, to the Welsbach Company, the Scott-Snell lamp, and the inverted incandescent, by means of which the mantle can be inverted or inclined at any angle. It can not only be adapted for decorative purposes on an equal footing with the electric glow lamp, but has the great advantage of being absolutely shadowless. On the whole, Mr. Percy Griffith gives a fair presentment of the position of the gas industry and the lines on which to look for success in future. He is, perhaps, inclined too make too much of what he calls the rivalry of the electric light. The advent of an electric light installation into a district attracts a great deal of attention. It is the object of the promoters that it should do so, and plans are carefully laid for advertising it directly and indirectly in every possible way, including being used as a stick to beat the local gas company. One result of this is that exaggerated views as to the effect on the gas business find currency, sometimes with unfortunate effects as regards nervous holders of gas stocks, and it will probably be news outside gas circles to know that very often the artificial turmoil created by the new sensation is absolutely without effect on the gas rentals and that the sales go on steadily following the normal rate of increase, just as they did before. In one or two isolated cases, where gas is dear or there is other reason for dissatisfaction, there has been a small percentage of decrease, but under ordinary conditions increased sales of gas have obtained rather than the reverse.

The current issue of the *Gas World* contains an interesting account of an interview with Dr. Geo. Wyld, a gentleman who has for the last 40 years advocated smoke abatement. A residence of 60 years in the Metropolis, during the greater part of which he was in medical practice, has convinced him that the smoke problem is a very real and pressing one, and on this point we may remark that a residence in London through one winter, let alone 60, would be sufficient to convince the most skeptical. Dr. Wyld is an active member of the Smoke Abatement Society and the chief direction in which he looks for improvement is the more general adoption of gaseous fuel, though he claims that it is quite feasible and practicable to use solid smokeless fuels such as coke or anthracite in an effective manner and at no greater cost than that incurred for bituminous coal. Acting on the excellent but not always accepted principle that "charity begins at home," he has fitted up his own house in a manner that practically illustrates the possibility of doing away with smoke. His grates for solid fuel are lined with firebrick and filled with blowers, also with a gas igniting device whereby the fire can be kindled without soiling the hands. He maintains that a very large business might be done with gas fire-lighters. But the most original suggestion emanating from this gentleman is, that the local authorities should buy up the gas companies, and dispense gas at a price that would enable it to compete with solid fuels, charging the loss, if any, upon the rates. It would be interesting to hear the coal merchants on that point. He argues that if gas was sold at say 1s. 6d. per 1,000 cubic feet the loss could be covered by a trifling addition to the rates, and that it would be a mere fraction of the cost annually incurred for whitewashing, painting and renovating, rendered necessary by the destructive effects of coal smoke. If the public submit to a rate of 2s. 9d. for the purposes of sewerage, he thinks they could very well pay 3d. in order to secure the advantages of a clear atmosphere. The Smoke Abatement Society has already done something in the way of securing convictions against owners of large factory chimneys, but has not brought any actual force to bear upon the ordinary domestic chimney. Dr. Wyld is not the only member of the medical profession who has recognized the value of gas from a hygienic standpoint, but he does not appear to have received encouragement or support from the large gas companies. Yet surely the enthusiasm exhibited by a gentleman of admitted practical ability, is capable of being turned to practical account. If it pays to issue leaflets and promote demonstrations in regard to one branch only, that of gas cooking, surely it would be equally wise, to take up the whole question of the use of gas for general household purposes, such as lighting fires, heating baths, warming apartments, etc. There are several directions in which the use of gas has not been exploited at all. And if these were taken up with the same degree of enthusiasm that has been devoted to the slot meter and gas cooker, a very important advance towards realizing the ideal of Dr. Wyld would be accomplished, and that without adding to the responsibilties of the already overworked municipal authorities, or increasing the burdens of the already fully loaded and growling rate payer.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

Mr. W. H. Fritchman, of New York, has accepted the temporary management of the gas and other properties of Council Bluffs that are controlled by Messrs. Street, Wykes and Company, of this city.

Mrs. Helen Armstrong, of Chicago, whose fame and ability as a lecturess on the satisfying art of cookery, rest on stability, writes us that she is ready for the road, with many engagements ahead. Perhaps the first of her demonstrations will be made this year in New Orleans, La., where she will lecture, on behalf of the New Orleans Lighting Company, for a fortnight at least, with the likelihood of an extension of the course for a third week. The "demonstrations" begin to-day. Writing of the New Orleans course, Mrs. Armstrong says: "The Com-

pany has placed such a phenomenal number of ranges there the past year, that now it is mainly a question of having them used for all cooking, etc."

THE following characteristic, straightforward letter to the JOURNAL, written by Mr. John A. Britton, of Oakland, Cal., under date of February 16th, explains itself completely:

To the Editors AMERICAN GAS LIGHT JOURNAL: The many friends of Mr. Edward C. Jones, throughout the limits of your circulation (which means the entire gas world) will no doubt be surprised to learn that he has tendered his resignation to the Directors of the San Francisco Gas and Electric Company, to take effect on March 1st. He will then enter the employ of the California Central Gas and Electric Company and the allied interests of Messrs. John Martin & Company. It is due to Mr. Jones, and to his prominent position in the gas fraternity as well, that no misunderstanding should arise amongst his friends and admirers concerning this change in his position; and as I am more intimate, perhaps, than anyone else on the Coast concerning all of the reasons that have combined to make up the same, I have taken this method of advising you so that through the columns of the JOURNAL all may know the truth of the matter. The many changes of differing characters that have taken place, not only in the personnel but in the business of the San Francisco Gas and Electric Company, have combined to make the position of Mr. Jones with the Company one that gave neither room to his talents nor to his scope of work. We who have known of his career on the Coast for the past 11 years have had nothing but admiration for his ability, his integrity and his faithfulness to all of the trusts reposed in him—not only to the Company for whom he labored but to the legion of friends that he made—and we know, and want the whole fraternity to know, that our confidence in Mr. Jones justifies him at all times in the step that he has taken. He enters not a competitive field but a broader one, in which his engineering abilities will have a broader and fuller scope, which will in every way tend to advance not only Mr. Jones himself but the large army of gas men with whom he will be directly connected and interested. The field which he will cover, embracing the workings of over 11 separate and distinct companies operated under different conditions, presents a prospect that no man could well afford to disregard, and as in the line of his profession he will have the confidence of those with whom he is associated, he will be able to bring into fuller play those qualities that have made him the friend of everyone on the Coast interested in our work. Mr. Jones was tendered the position that he is to occupy by Mr. Martin, who recognized in him the only practical, operating gas engineer on the Coast who was thoroughly familiar with conditions here; and, as I have before stated, Mr. Jones accepted it, feeling that he was in every way bettering himself. His resignation has been before the Board of Directors of the San Francisco Gas and Electric Company for some time, and they have vainly endeavored to cause Mr. Jones to alter his determination, offering him greater inducements and courteously declining to accept his resignation; but Mr. Jones firmly held to his decision and will take his new field the 1st prox. I feel, from intimate connection with the gas men of the Coast for over 25 years, that all of them wish him Godspeed in his new office, and hold for him the same meed of friendliness and wishes for his future that they have always justly held; and I further voice the sentiment that the gas men here and elsewhere will be materially benefited by the experiences that he will gain in the new sphere. The Company to which he goes is a large factor in the California field, and its President, Mr. John Martin, has, by his progressive and broadminded policies, paved a way for the introduction of the methods that Mr. Jones represents, and has at all times represented here.

THE Secretary of State of North Carolina recently issued letters chartering the Washington (N. C.) Light and Water Company, with an authorized capital of $20,000 and the privilege of increasing the amount to $200,000. The incorporators are Messrs. S. S. Spruks, Geo. T. Leach, A. N. Walker and H. J. Spruks. Later on this concern purchased the Washington Gas Company, with the result that the former is now in full control of the lighting and water supply of Washington. Mr. A. K. Stephens continues in the position of Superintendent.

THE new water gas plant for the Citizens Gas Light Company, of Nebraska City, Neb., has just been completed, and Superintendent Hayes is planning for an extension of the main system, that will require the placing of not less than three miles, which will be finished by May 1st.

SOME time ago we reported that Mr. R. D. Wirt, for over 20 years the active man in the management of the Independence (Mo.) Gas and Coke Company, had resigned the position in order to assume direct charge of important interests controlled by him in Philadelphia, Pa. Shortly before his departure a committee of the citizens of Independence waited upon him, and presented him with a handsome gold pendant which carried the inscription, "Presented to R. D. Wirt, by the citizens of Independence, Missouri, as a testimonial to his valuable services in the development of Independence." The presentation was made by the Mayor of the city, Mr. S. H. Woodson; and other addresses of congratulation, as to the worth of Mr. Wirt as a citizen and business man of Independence, were made by Messrs. J. D. Wood, J. W. Mercer, John A. Lea, J. T. Crisp and W. A. Findley. When the formal presentation was at an end, refreshments were served in the dining room of the Jones Hotel.

ABOUT mid-February the gas works of the Bandon (Ireland) municipality were seized by the Sheriff, who sold at public auction the coal, coke and other available materials on hand. The result was the failure of the gas supply of the city, which caused much inconvenience.

THE contract for the construction of a new storage holder (to retain 100,000 cubic feet) on the works of the Alton (Ills.) Railway, Gas and Electric Company, has been awarded to the Stacey Manufacturing Company, of Cincinnati, O.

THE projectors of the new plant for Cadillac, Mich., who are in the main residents of Ypsilanti, Mich., have filed articles of incorporation. The concern is to be known as the Cadillac Gas Company, and it is capitalized in $70,000.

MESSRS. JAMES T. LYNN and associates have filed arttcles of associattion concerning the Detroit Arc Gas Light Company. The capital of the Company is put at $100,000.

THE Supreme Court of the State of New Jersey has construed that which is known as the Voorhees 2 per cent. franchise tax law of 1901 to exempt from its operation those public utility companies that work under special charters granted to them by the Legislature before the passage of general laws for the incorporation of such companies. This decision will apply to the taxable list of many New Jersey companies.

THE South Jersey Gas, Electric and Traction Company has added to its list of properties the Riverside Gas Company, which has been supplying gas to the residents of the contiguous boroughs of Palmyra, West Palmyra, Riverton, Riverside and Moorestown, N. J.

THERE is talk of an opposition company for Chillicothe, O. The main ones now appearing in the movement are said to be Messrs. O. A. Smith and George Lucas, of Pekin, Ills.

THE contract for furnishing gas coal to the City Gas Works, of Wheeling, West Va., for the year from the 1st inst., has been awarded to J. C. McKinley, who represents a concern known as the Monongah Coal Company.

A PROPOSITION for the establishment of a gas works at Central City, Neb., has been made to the authorities of that place.

MR. AND MRS. FRED. BREDEL are home from Europe, after a trip that took about a month for its completion.

MR. WALTER WHITE, on the action of the attorney who represents the bondholders of the Plattsmouth (Neb.) Gas and Electric Light Company, has been appointed receiver of the named properties. He will have full charge of the same pending the action of the court in the case instituted against the city of Plattsmouth by the bondholders, under which the latter claim that the city is indebted to them in the sum of $30,000. The case will not be reached for trial until some time in May.

THE mains of the Middletown (Pa.) Gas Light Company are to be extended to and through the streets of the outlying village of Royalton.

A CORRESPONDENT in Denver, Col., forwards the following clipping: "Last December the Denver Gas and Electric Company, having been unable to make collection for bills for supply of gas furnished to a young attorney of this city, and having several times threatened to turn off the gas unless the amount was settled, put its threat into execution

(*Continued on page* 306.)

THE AMERICAN GAS LIGHT JOURNAL

A. M. CALLENDER & CO.,
PROPRIETORS.

THOS. J. CUNNINGHAM,
ELBERT P. CALLENDER,
EDITORS.

CHAS. E. SANDERSON,
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(*Concluded from page* 305.)

and turned off the gas. The Company recently brought suit against this consumer for the unpaid bill for 4 months preceding the turning off of the gas, amounting to the sum of $32.40. The case came on for trial some days ago in the justice court of William F. Hynes. The defendant demanded and was granted a jury. The Gas Company showed that it had furnished gas to the defendant at his request; that it had presented bills, which had not been paid, and that those bills were at the regular rate, as determined by the meter readings. The Company also showed that the meters had been examined and tested, and had been found to be correct. The defendant failing in the endeavor to show that the bills were incorrect, introduced evidence of the inconvenience and expense to which he had been put by the turning off of the gas, and claimed $100 as damages for this, and for the alleged trespass of the Company in entering his premises to turn off the gas. The Company relied upon its contract with the consumer, giving it the right to enter his premises for this purpose. The jury did not adopt the view that the defendant was entitled to any damages, but promptly recognized the justice of the Gas Company's demand and returned a verdict for $32.40, the amount of the bill, and costs."

MESSRS. ADAM WEBER SONS desire us to state that their main offices have been removed to the Park Row Building, 13 to 21 Park Row, New York.

The Market for Gas Securities.

There is virtually no change in the quotations for Consolidated gas, comparing the same with those that prevailed last week at the closing. To-day (Friday) the last prices were 218 to 219, which, of course, is ex dividend of 2 per cent., payable the 15th inst. There was, however, quite some trading in the shares. Rumor is still busy with the thought of alliance between the Consolidated and the Brooklyn Union, but those who should know declare that the combination is not any nearer to completion than it was six months ago.

Brooklyn Union is dull and weak. In fact the ruling quotation for it to-day (215 to 217) is absolutely nominal. Peoples, of Chicago, is steady, and strength remains a characteristic of Baltimore Consolidated, the recent advance in which is well maintained. It is understood that control in the Gas and Electric Company, of Bergen county, N. J., is still in doubt, with the chances for such favoring the party opposed to what may be termed the Seventh National Bank interest. Cincinnati Gas and Electric holds its own well.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

16 WALL STREET, NEW YORK CITY.

MARCH 3.

☞ All communications will receive particular attention. ☜ The following quotations are based on the par value of $100 per share.

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked.*
Consolidated	$73,177,000	100	218	219
Central Union, Bonds, 5's	3,000,000	1,000	109½	111
Equitable Bonds, 6's	1,000,000	1,000	105	
" 1st Con. 5's	2,300,000	1,000	115	118
Metropolitan Bonds	658,000	..	108	112
Mutual	3,500,000	100	310	315
Municipal Bonds	750,000	..	..	
New Amsterdam Gas Co.. Bonds, 5's	11,000,000	1,000	111	112
Northern Union, Bonds, 5's	1,250,000	1,000	106	108
New York and East River.. Bonds 1st 5's	3,500,000	1,000	111	115
" 1st Con. 5's	1,500,000	..	109	111
Richmond Co., S. I.	348,650	50	100	..
" Bonds	100,000	1,000	103	
Standard	5,000,000	100	130	135
Preferred	5,000,000	100	150	155
Bonds, 1st Mortgage, 5's	1,500,000	1,000	118	..
Yonkers	299,650	500	130	
Out-of-Town Companies.				
Brooklyn Union	15,000,000	100	215	217
" " Bonds (5's)	15 000,000	1,000	119	119½
Bay State	50,000,000	50	⅝	¾
" Income Bonds	2,000,000	1,000	.	75
Binghamton Gas Works	450,000	100	28	30
" 1st Mtg. 5's	509,000	1,000	93	96
Boston United Gas Co.— 1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	7½	9
" " Bonds, 5's	5,250,000	1,000	79	80½
Capital, Sacramento	500,000	50	..	35
Bonds (6's)	150,000	1,000		
Central San Francisco	2,000,000	..	106	108
Chicago Gas Co. Guaranteed Gold Bonds	7,650,000	1,000	104	104¼
Cincinnati Gas & Elec. Co.	29,500,000	100	101½	102
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	106	107
Columbus (O.) Gas Lt. & Heating Co	1,682,750	100	60	65
Preferred	3,026,500	100	84	86
Consumers, Jersey City Bonds	600,000	1,000	102	103
Consumers, Toronto	1,700,000	50	218	225
Consolidated, Baltimore	11,000,000	100	67⅛	67¼
Mortgage, 6's	3,600,000	..	..	118
Chesapeake, 1st 6's	1,000,000	..	..	..
Equitable, 1st 6's	910,000	..	..	..
Consolidated, 1st 5's	1,490 000	..	.	112
Consolidated Gas Co. of N. J.	1,000,000	100	12	14
" Con. Mtg. 5's	880,000	1,000	80	81
Consolidated G. & E. Co.'s., Little Falls, N.Y.	90,000	100	..	100
Bonds	75,000	..	..	100
Detroit City Gas Co	4,825,500	50	.	89
" Prior Lien 5's	5,603,000	1,000	99½	100
Detroit Gas Co., 5's	381,000	1,000	89	89½
" Inc. 5's	16,000	100	94	94½
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	..	101
Essex and Hudson Gas Co.	6,500,000	..	34	38
Fort Wayne	2,000,000	..	..	.
" Bonds	2,000,000	..	53	55
Grand Rapids Gas Lt. Co. 1st Mtg. 5's	1,225,000	1,000	102	104
Hartford	750,000	25	245	265
Hudson County Gas Co., of New Jersey	10,500,000	..	25	..
" Bonds, 5's	10,500,000	..	101	103
Indianapolis	2,000,000	..	60	64
" Bonds, 6's	2 650,000	..	99½	101¼
Jackson Gas Co	250,000	50	73	75
" 1st Mtg. 5's	290,000	1,000	101	102¼
Kansas City Gas Light Co., of Missouri	5,000,000	100	..	36
Bonds, 1st 5's	3,822,000	1,000	102	104
Laclede, St. Louis	10,000,000	100	.	99
Preferred	2,500,000	100	100	108
Bonds	10,000,000	1,000	..	108½
Lafayette Gas Co., Ind.	1,000,000	100		60
Bonds	1,000,000	1,000	48	55
Louisville	2,570,000	50	110	120
Madison Gas & Elec. Co. " 1st Mtg. 6's	350,000	1,000	107½	109½
" 6 per cent. scrip, due 1910	100,000	25	25	87
Montreal, Canada	2,000,000	100	182	184¾
Newark, N. J., Con. Gas Co	6,000,000	..	..	55
Bonds, 6's	4,600,000	..	..	103
New Haven	1,000,000	25	300	325
Nashville Gas Lt. Co.	1,000,000	100	110	..
Oakland, Cal.	2,000,000	..	46	47
" Bonds	750,000	..	..	..
Peoples G. L. & Coke Co., of Chicago	25,000,000	100	99⅝	99⅞
Peoples Gas Lt. & Coke Co., Chicago, 1st Mortgage	20,100,000	1,000	..	..
2d "	2,500,000	1,000	104	
Rochester Gas & Elec. Co..	2,150,000	50	88	..
Preferred	2,150,000	50	118	..
Consolidated 5's	2,000,000	..	87½	90
San Francisco, Cal.	10,000,000	100	48	48½
St. Paul Gas Light Co.	1,500,000	100	60	63
1st Mortgage 6's	650,000	1,000	113	116
Extension, 6's	600,000	1,000	112½	115
General Mortgage, 5's	2,465,000	1,000	93	96
St. Joseph Gas Co. " 1st Mtg. 5's	751,000	1,000	98	99
Syracuse, N. Y.	1,750,000	100	15	17
Bonds	1,612,000	1,000	95½	97½
Washington, D. C	2,600,000	20	..	..
First mortgage 6's	600,000	..	..	..
Western, Milwaukee. Bonds, 5's	4,000,000	..	106½	108
Wilmington, Del	600,000	50	232	..

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Position as Manager or Superintendent of a Gas Works.

Have had years of experience. Excellent references. Address, "F. J. R.,"
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By a young man having 14 years' experience in construction work and in the manufacture and distribution of coal and water gas. Change desired. References.
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Lamps will be crated and delivered on board cars in good order. Address,

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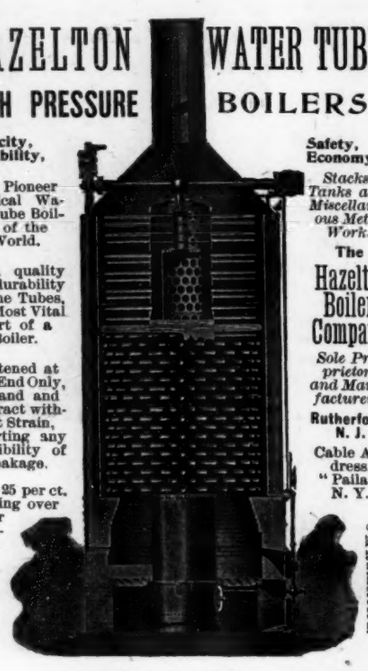

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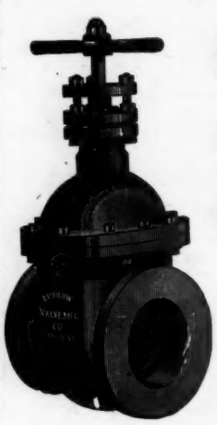

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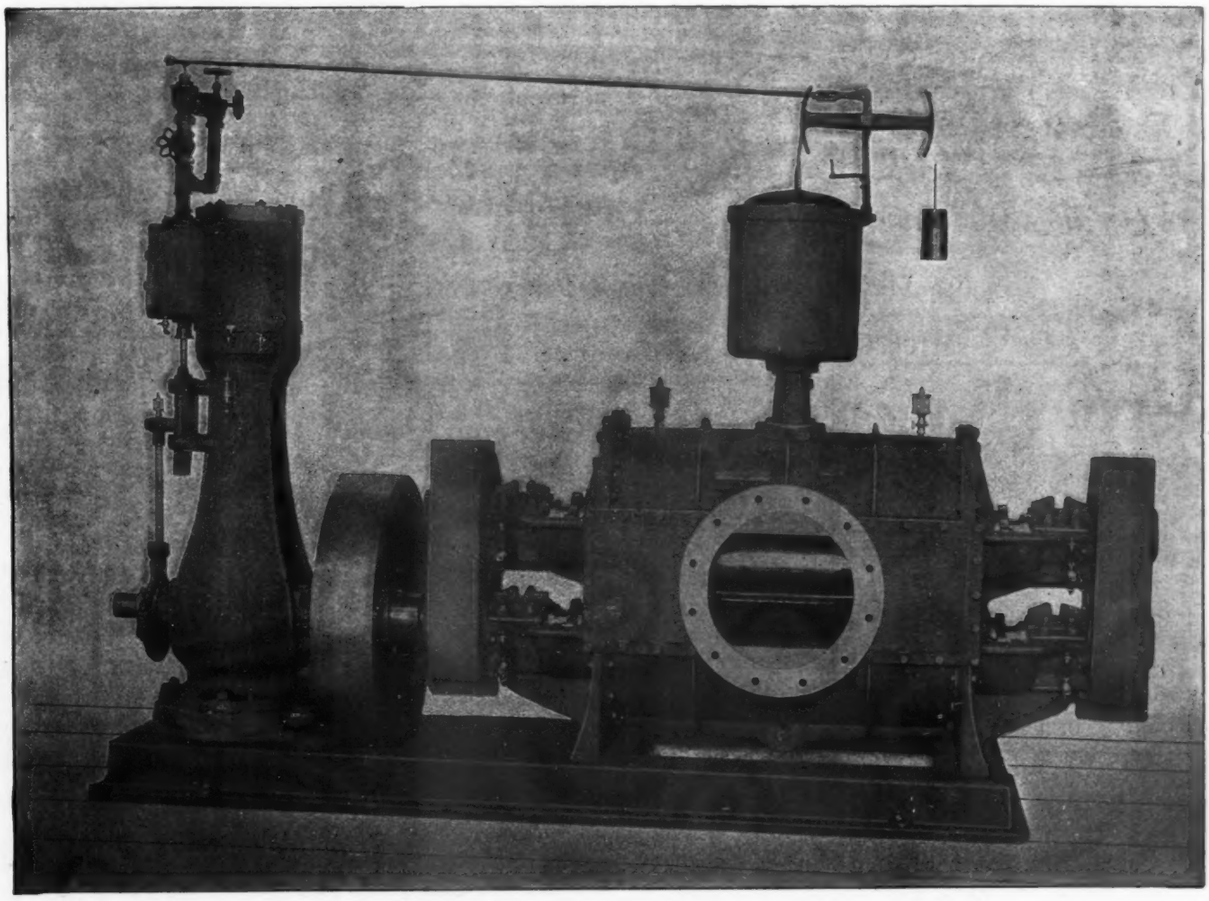

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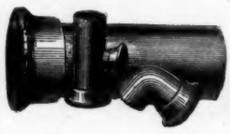
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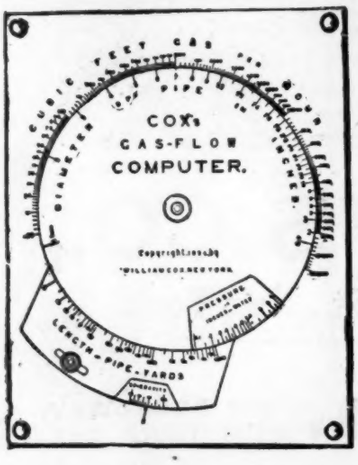

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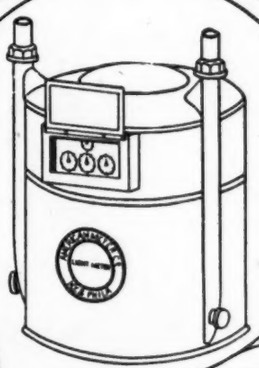

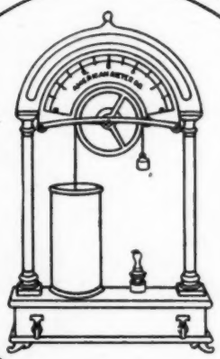

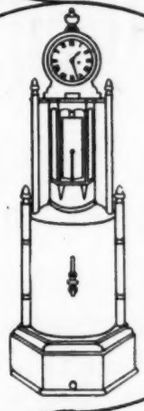

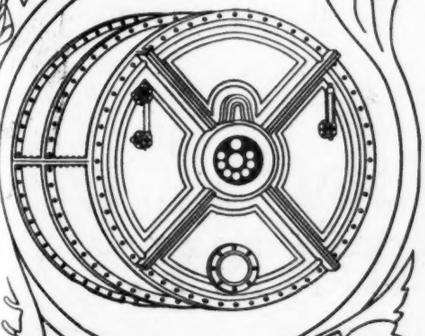

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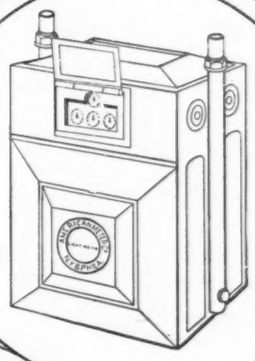

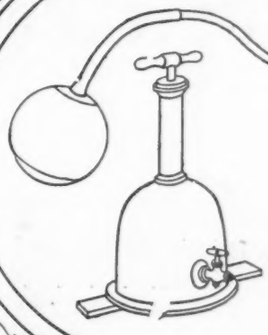

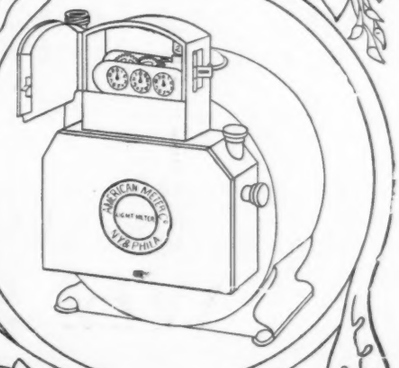

PUBLIC LIGHTING TABLE.

MARCH, 1902.

Day of Week.	Date.	Table No. 1. Following the Moon. Light.	Table No. 1. Following the Moon. Extinguish.	Table No. 2. New York City. All Night Lighting. Light.	Table No. 2. New York City. All Night Lighting. Extinguish.
				P.M.	A.M.
Sat.	1	6.20 PM LQ	2.00 AM	5.30	5.45
Sun.	2	6.30	2.50	5.30	5.45
Mon.	3	6.30	3.40	5.30	5.45
Tue.	4	6.30	4.20	5.30	5.45
Wed.	5	6.30	5.00	5.40	5.35
Thu.	6	6.30	5.30	5.40	5.35
Fri.	7	6.30	5.30	5.40	5.35
Sat.	8	6.30	5.30	5.40	5.35
Sun.	9	6.30 NM	5.20	5.40	5.35
Mon.	10	6.30	5.20	5.40	5.35
Tue.	11	6.30	5.20	5.40	5.35
Wed.	12	6.30	5.20	5.50	5.20
Thu.	13	6.30	5.20	5.50	5.20
Fri.	14	10.30	5.20	5.50	5.20
Sat.	15	11.40	5.20	5.50	5.20
Sun.	16	12.30 AM FQ	5.10	5.50	5.20
Mon.	17	1.20	5.10	5.50	5.20
Tue.	18	2.10	5.10	5.50	5.20
Wed.	19	2.50	5.10	6.00	5.10
Thu.	20	3.20	5.10	6.00	5.10
Fri.	21	4.00	5.10	6.00	5.10
Sat.	22	No L.	No L.	6.00	5.10
Sun.	23	No L. FM	No L.	6.00	5.10
Mon.	24	No L.	No L.	6.00	5.10
Tue.	25	6.50 PM	9.00 PM	6.00	5.10
Wed.	26	6.50	10.00	6.10	4.55
Thu.	27	6.50	11.00	6.10	4.55
Fri.	28	6.50	11.50	6.10	4.55
Sat.	29	6.50	12.40 AM	6.10	4.55
Sun.	30	6.50	1.30	6.10	4.55
Mon.	31	6.50 LQ	2.10	6.10	4.55

TOTAL HOURS LIGHTING DURING 1902.

By Table No. 1.	Hrs.Min.	By Table No. 2.	Hrs.Min.
January	238.30	January	423.20
February	196.20	February	355.25
March	196.20	March	355.35
April	166.40	April	298.50
May	151.40	May	264.50
June	131.10	June	234.25
July	142.40	July	243.45
August	162.00	August	280.25
September	179.00	September	321.15
October	216.30	October	374.30
November	224.10	November	401.40
December	250.00	December	433.45
Total, yr.	2255.00	Total, yr.	3987.45

NEW YORK, 33 Nassau Street. PHILADELPHIA, Broad and Arch Streets. CHICAGO, Foot of Orleans Street. BOSTON, 624 Tremont Building.
CLEVELAND, 809 Cuyahoga Building. ST. LOUIS, 712 Roe Building. SAN FRANCISCO, 712 Polk Street.

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.... OF AMERICA ....

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IT LIGHTS THE STREET.

Where there are no gas mains we can furnish an equally good light by our SELF-GENERATING NAPHTHA WELSBACH BURNER, and thereby supply a uniform light in all localities.

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The most practical, efficient and artistic burner yet produced. . . . . .

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It can be used with all styles and sizes of glassware, either shades or globes. No further necessity to carry a stock of different burners for the many sizes and shapes of glassware.

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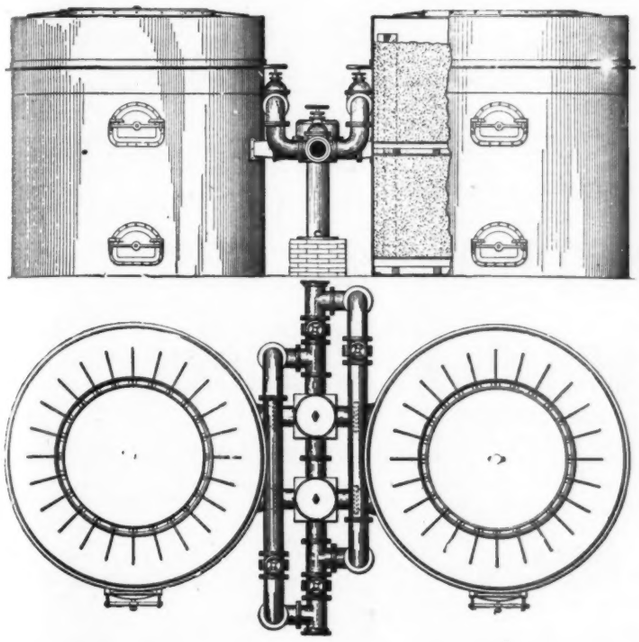

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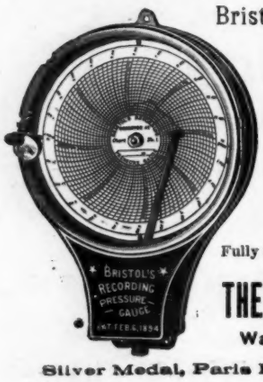

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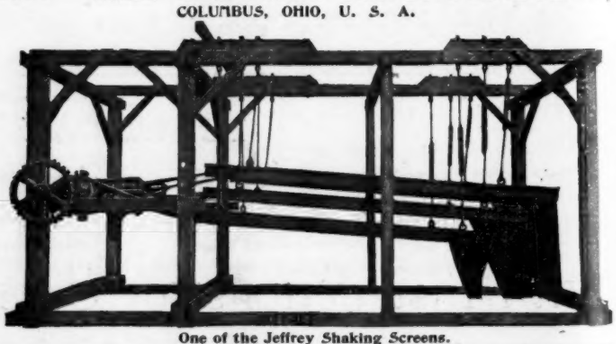
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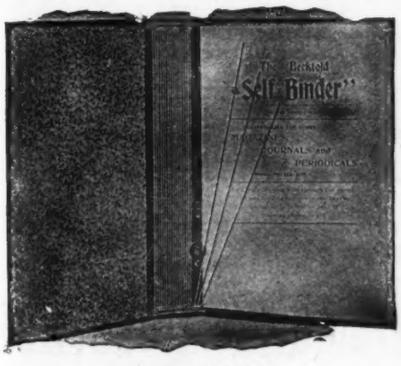

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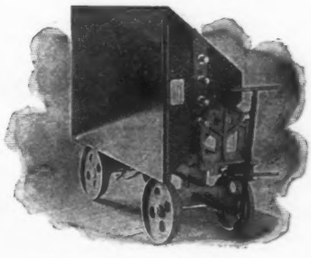

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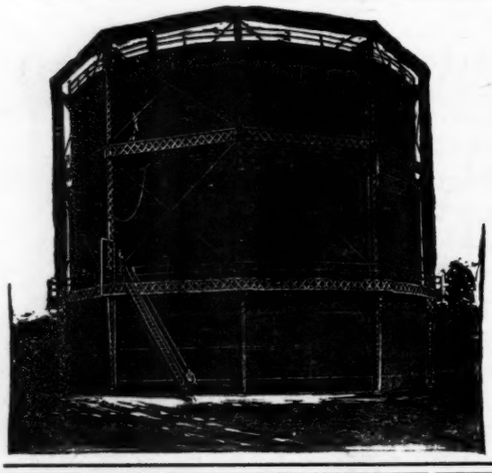

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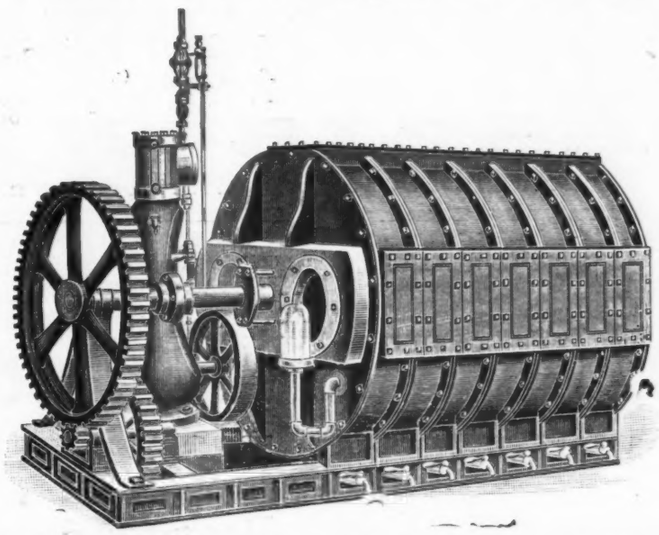

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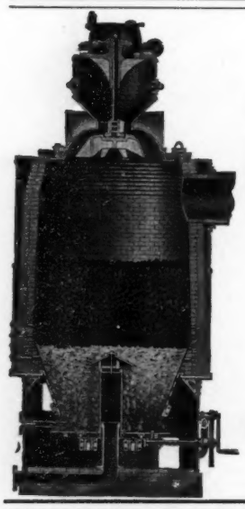

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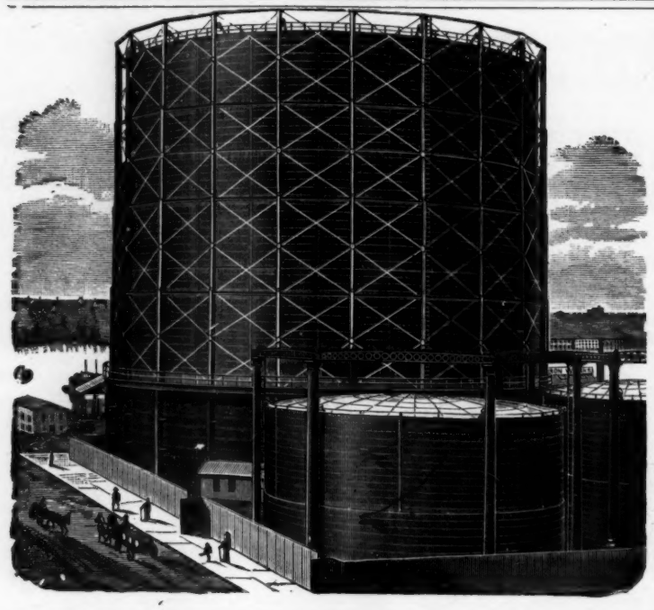

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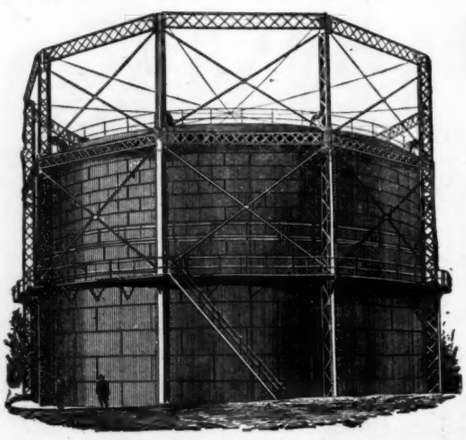

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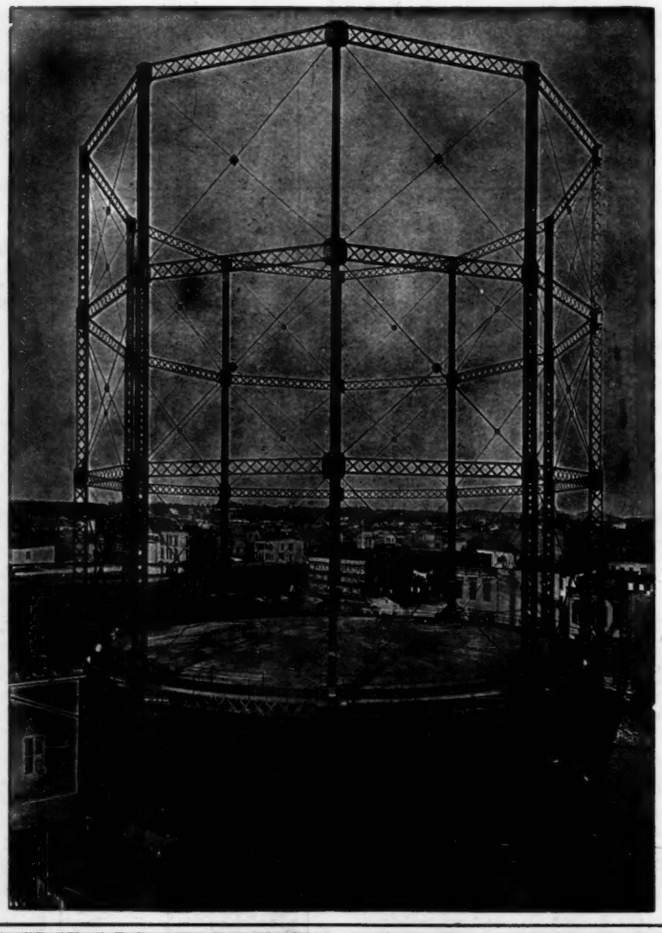

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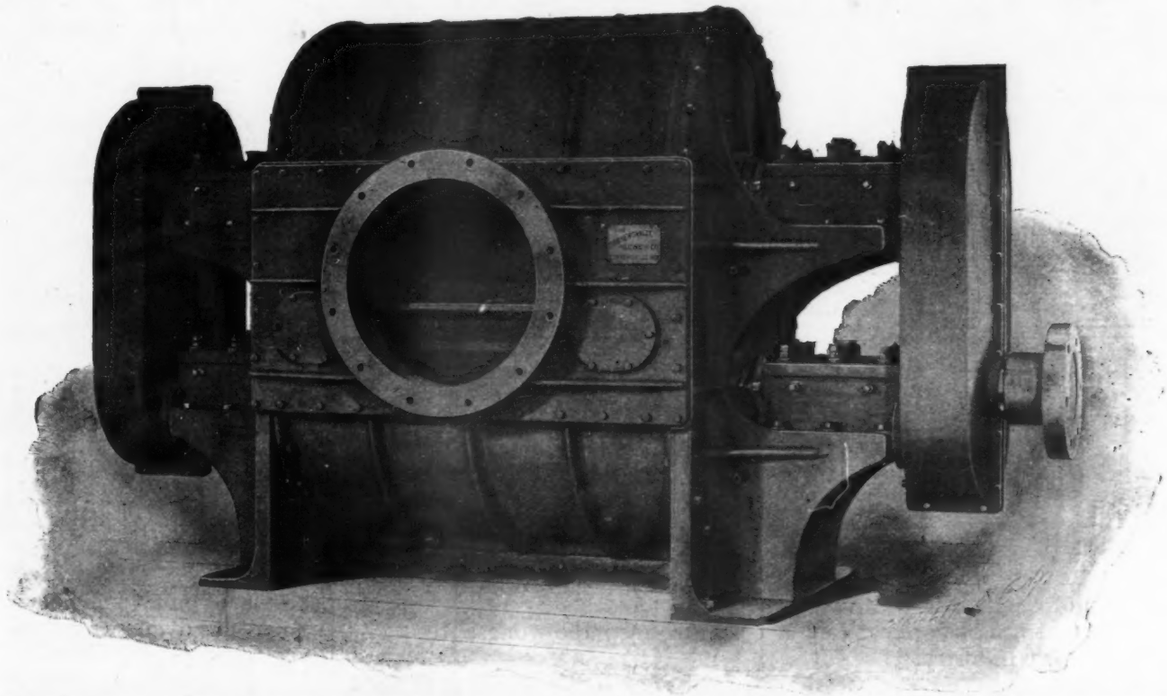

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